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# A slitless spectroscopic survey for H $\alpha$ emission-line objects in SMC clusters

Christophe Martayan<sup>1,2</sup>, Dietrich Baade<sup>3</sup>, and Juan Fabregat<sup>4</sup>

<sup>1</sup> European Organisation for Astronomical Research in the Southern Hemisphere, Alonso de Cordova 3107, Vitacura, Casilla 19001, Santiago 19, Chile

<sup>2</sup> GEPI, Observatoire de Paris, CNRS, Université Paris Diderot, 5 place Jules Janssen, 92195 Meudon Cedex, France

<sup>3</sup> European Organisation for Astronomical Research in the Southern Hemisphere, Karl-Schwarzschild-Str. 2, 85748 Garching b. München, Germany

<sup>4</sup> Observatorio Astronómico de Valencia, edifici Instituts d'investigació, Poligon la Coma, 46980 Paterna Valencia, Spain

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## ABSTRACT

**Aims.** This paper checks on the roles of metallicity and evolutionary age in the appearance of the so-called Be phenomenon.

**Methods.** Slitless CCD spectra were obtained covering the bulk of the Small Magellanic Cloud. For H $\alpha$  line emission twice as strong as the ambient continuum, the survey is complete to spectral type B2/B3 on the main sequence. About 8,120 spectra of 4,437 stars were searched for emission lines in 84 open clusters. 370 emission-line stars were found, among them at least 231 near the main sequence. For 176 of them, photometry could be found in the OGLE database. For comparison with a higher-metallicity environment, the Galactic sample of the photometric H $\alpha$  survey by McSwain & Gies (2005) was used.

**Results.** Among early spectral sub-types, Be stars are more frequent by a factor  $\sim 3$ -5 in the SMC than in the Galaxy. The distribution with spectral type is similar in both galaxies, i.e. not strongly dependent on metallicity. The fraction of Be stars does not seem to vary with local star density. The Be phenomenon mainly sets in towards the end of the main-sequence evolution (this trend *may* be more pronounced in the SMC); but some Be stars already form with Be-star characteristics.

**Conclusions.** In all probability, the fractional critical angular rotation rate,  $\Omega/\Omega_c$ , is one of the main parameters governing the occurrence of the Be phenomenon. If the Be character is only acquired during the course of evolution, the key circumstance is the evolution of  $\Omega/\Omega_c$ , which not only is dependent on metallicity but differently so for different mass ranges.

**Key words.** Stars: early-type – Stars: emission-line, Be – Stars: fundamental parameters – Stars: evolution – Galaxies: Magellanic Clouds – Astronomical data bases: Catalogs

## 1. Introduction

The so-called Be phenomenon manifests itself through the single, intermittent, or permanent occurrence of emission lines in main-sequence stars with spectral types O through A. This line emission arises from rotationally supported disks formed from matter lost (often ejected) by the central star. An excellent introduction to the complex idiosyncrasies of Be stars is given by Porter & Rivinius (2003). While extremely rapid rotation is a necessary condition for the Be phenomenon, it is not clear whether it is also sufficient or which other conditions need to be fulfilled. There are reports suggesting that the Be phenomenon also depends on metallicity (Maeder et al. 1999) and evolutionary phase (e.g., Fabregat & Torrejón 2000; Martayan et al. 2007b). An obvious method to investigate

the latter possibility is the study of open star clusters with a suitable range of ages. In the Galaxy, it has been applied various times but mostly using photometric techniques. A very good discussion of the subject and previous work can be found in McSwain & Gies (2005).

In the Small Magellanic Cloud (SMC), a major spectroscopic survey for emission-line objects was performed by Meyssonnier & Azzopardi (1993). Although it identified 1898 emission-line objects, the photographic nature of the data did not permit too many emission-line stars to be found near the main sequence or in crowded areas such as open clusters. This paper reports on the first digital slitless-spectroscopy survey of the SMC in search for Oe/Be/Ae stars (a second paper will concern the LMC). During its execution, some 3 million spectra were obtained.

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Send offprint requests to: C. Martayan

Correspondence to: Christophe.Martayan@eso.org

## 2. Observations

The observations<sup>1</sup> were carried out (by JF) on September 25 and 26, 2002 with the Wide Field Imager (WFI) attached to the 2.2m MPG Telescope at ESO’s observatory on Cerro La Silla in Chile (see Baade et al. 1999). Due to bad weather, the second night was only partly useful.

In its slitless spectroscopic mode the WFI has a crudely circular field of view of diameter 0.31 degrees. The R50 grism yields a dispersion of 54 nm/mm or 0.811 nm/pixel. The nominal resolution at optimal focus and seeing is 5.1 nm at H $\alpha$ . In order to reduce crowding and overlapping spectra, the length of the spectra was limited by means of a filter with a full width at half maximum of 7.4 nm centered on H $\alpha$ . This means that spectra are acceptably separated if the stars are 2'' apart perpendicular to the dispersion direction and 6'' apart along this direction. These numbers vary slightly with the quality of the focus. But in general they do not require an adaptation of the parameters for the automatic extraction by software of the spectra.

The exposure time per field was set to 600 s. The coverage of the SMC achieved with 14 telescope pointings is shown in Fig. 1.

For a similar study with the WFI but in the Galaxy and with a broader filter, see Martayan et al. (2008).

## 3. Data reduction, extraction of spectra, and identification of emission-line stars

### 3.1. Data reduction

The elementary CCD image processing was performed with IRAF<sup>2</sup> tasks and the MSCRED package.

The subsequent extraction of the bias- and flat field-corrected spectra posed considerable technical challenges:

- All images suffer from substantial and non-homogeneous defocus, which increases from the field center to the edges. The reasons could not be reconstructed. (However, special techniques permit continuum and emission-line objects to be distinguished at a fairly acceptable level of confidence, turning the problem almost into an advantage - see Fig. 2.)
- Each object appears in several spectral orders. The 0th order is undispersed and corresponds to the point-spread function (PSF). The order suitable for the extraction of the H $\alpha$  spectra is -1, which in the following will be referred to as “the spectrum”. In the case of bright stars, up to 7 or even 8 orders are visible,

significantly increasing the probability of spectra being contaminated. While this implies the possible non-detection of some emission-line objects, it will not lead to false detections because even the 0th order has a very different PSF.

- There are parasitic spectra resulting from scattered light from stars outside the direct field of view.
- The position angle of the dispersion direction varies (by  $\leq \pm 5^\circ$ ) from the center to the edges of the images.

In principle, spurious detections of emission-line objects may arise from particle events or hot pixels. However, their very different PSFs make such confusions rather unlikely. The extraction algorithm used tries to automatically reject particle hits. On the other hand, the completeness of the survey is reduced by spectra falling onto the gaps (amounting to 3.1 % in area) between the 4x2 CCDs of the WFI.

After careful, realistic tests with representative subsets of the data it was decided that it is not just most time effective but also still safe to let properly tuned software search for spectra automatically. For this task and the 2-D extraction of the spectra SExtractor (Bertin & Arnouts 1996) was employed with specially adapted convolution masks (E. Bertin, private communication). About 3 million spectra were extracted in the whole SMC (14 images, see Fig. 1), of which about 1 million are useful.

A comparison of such extracted spectra with spectra counted by eye suggests that the extraction efficiency in clusters is on average around 75 to 80%, depending on the area density of the stars. With position of the cluster in the WFI field, i.e. mainly the level of de-focus, this mean value may range from 60% to 100%.

Because of the need to work on samples with defined ages, only the areas of 83 clusters listed in the OGLE database (Udalski et al. 1998) and a number of neighboring comparison fields (14 fields, 1 or 2 per target field and with diameters of 2 to 4', located close to the open clusters treated) were retained for the classification as stars with and without line emission. The open clusters selected in this way (from Pietrzynski & Udalski 1999) are compiled in Table B.1; other parameters (total number of stars, number of emission-line stars, etc.) are included (where applicable, separately for multiple observations of a given cluster). This process led to a sample of 7,867 spectra to be examined for the presence of line emission.

The WFI database includes an 84th open cluster: NGC 346, which is a complex young structure, probably consisting of a number of sub-aggregates. But OGLE photometry is not available for this dense field, which also suffers from extended nebular emission. Details are in Sect. A. Fig. 3 shows the distribution of studied open clusters in the SMC as well as the metallicity areas by Cioni et al. (2006). They confirm that the open clusters are in metallicity environment significantly lower than the Galactic one.

<sup>1</sup> Observations at the European Southern Observatory, Chile under project number 069.D-0275(A)

<sup>2</sup> IRAF is distributed by the US National Optical Astronomy Observatory, which is operated by the Association of Universities for Research in Astronomy (AURA), Inc., under cooperative agreement with the US National Science Foundation

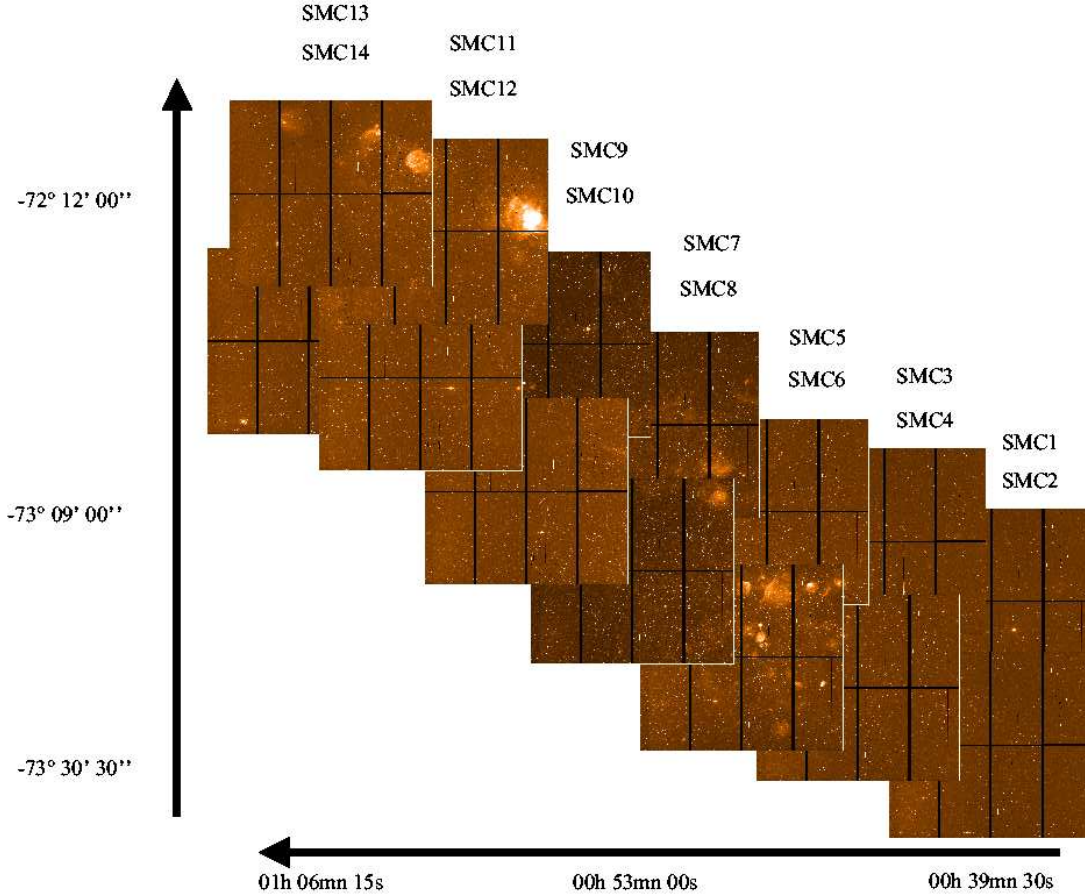


Fig. 1. The tiling by WFI frames of the Small Magellanic Cloud.

### 3.2. Identification of emission-line stars: the *Album* code

The exploratory tests alluded to above also showed that it would not be safe to let software distinguish without human supervision between stars with and without H $\alpha$  line emission. However, the visual classification of several thousand spectra could be greatly facilitated by transforming them into an easy-to-classify format. To this effect, the *Album* package was written (in *IDL*).

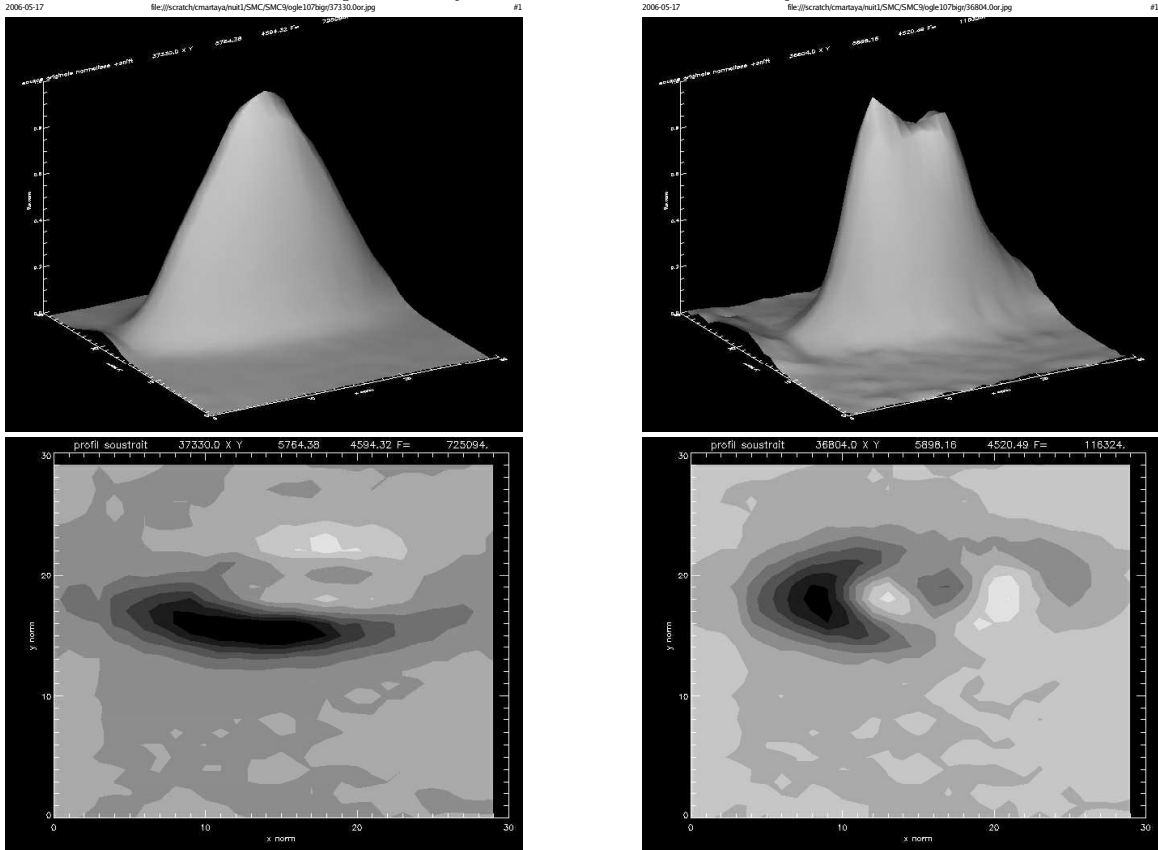
*Album* starts out from the assumption that the 2-D PSF is only slowly varying with position in the frame. To compute the latter, typically 50-250 spectra were registered (by cross correlation), co-added, and normalized. This step is operator-supervised; ill-suited stars can be rejected. In the first step, all obvious emission-line stars, apparent binaries, too closely spaced sources, spectra with severe particle hits or otherwise reduced quality are rejected and a new regional mean spectrum is computed. It was empirically established that the inclusion, at the  $\leq 5\%$  level, of emission-line objects only insignificantly modifies the regional mean spectrum profile. The resulting regional template spectrum was subtracted (after cross correlation and shift) from each normalized 2-D spectrum (see Fig. 2-left) to be checked for H $\alpha$  line emission. *Album* also rejects

automatically artifacts such as ghosts or particle events by applying a suite of tests to the shapes of the spectra.

In the case of emission-line stars, the 2-D spectra show a secondary peak (see Fig. 2). But after subtraction of the mean PSF the resulting difference images display a more characteristic and conspicuous ring-like structure. This is due to the large defocus, which affects the at most marginally resolved line emission like a point source. Therefore, while the continuum flux is just blurred by the defocus, the line emission takes on roughly the shape of a donut or horseshoe (i.e. the telescope pupil).

In a properly prepared and homogeneous album (hence the name *Album*) of images, this peculiar structure is conveniently and more readily and reliably recognized by the human eye than by software developed with the same amount of effort.

Using this scheme, all stars were classified into three categories: definite emission-line stars, candidate emission-line stars, and stars without H $\alpha$  line emission. An emission-line star is considered definite, if its flux distribution shows a significant secondary peak (cf. Fig. 2) at a position consistent with H $\alpha$ . Obviously, this depends on the signal-to-noise ratio but also on the location within the frame and the associated defocus. If the purity of this

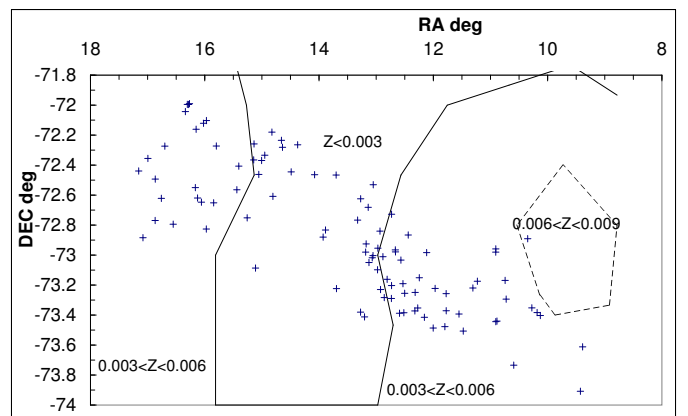


**Fig. 2.** The appearance of objects with and without  $H\alpha$  line emission in defocused slitless WFI spectra. Left: Non-emission-line star, right: emission-line star. Top: 3-D presentations of the original flux distributions, bottom: 2-D projections of the residuals after subtraction of the mean, scaled point-spread function (PSF) of pure continuum sources. While a pure continuum source is just blurred by the defocus, a (nearly unresolved) emission line is effectively imaged like a point source, yielding a roughly donut (or horseshoe) like image of the pupil. The bright excess above the mean of the image corresponding to the emission peak is visible in the middle-left of the horseshoe (bottom right figure).

signature is potentially diluted by particle events or noise spikes, the object is called a candidate emission-line star. For example, for relatively bright objects from  $V=14$  to 17, 100 to 80 % of the emission-line stars found are classified as definite emission-line stars. However, towards lower brightness and lower signal-to-noise ratio, the fraction of definite emission-line stars drops from 55 to 13 %.

### 3.3. Efficiency of $H\alpha$ emission detection

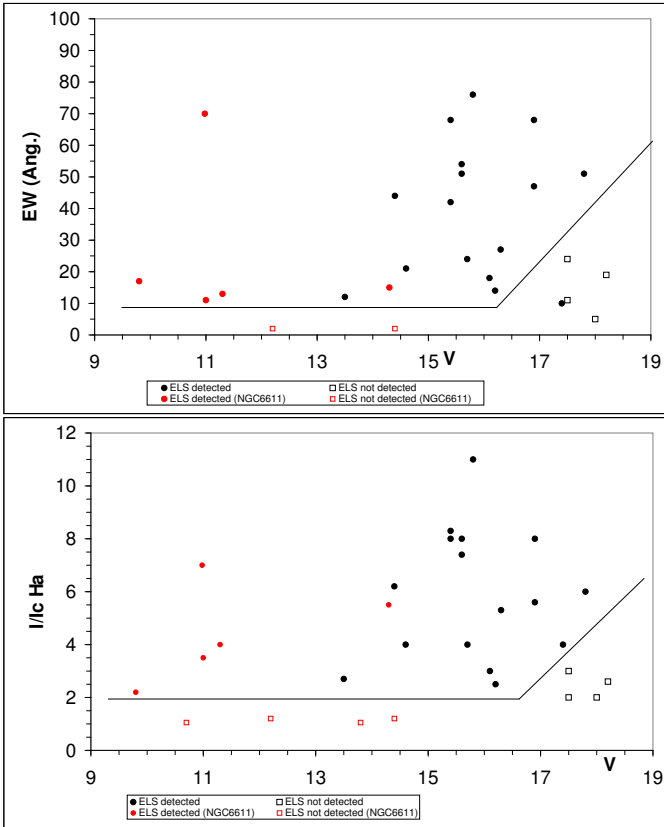
In order to determine the thresholds for the detection of  $H\alpha$  emission, *Album* was applied to WFI observations of the open cluster NGC 330 and its well-studied population of Be stars. With the help of *SIMBAD* the previously known Be stars and the ones found by *Album* were compared, and the  $H\alpha$  equivalent widths and line strengths were taken from Hummel et al. (1999, 2001); Martayan et al. (2007a), similar to the WFI observations of NGC 6611 by Martayan et al. (2008). The results are shown in Figure 4 for the detection efficiency in terms of  $H\alpha$  line emission equivalent width (top) and strength



**Fig. 3.** The positions of the WFI SMC clusters superimposed on spatial iso-metallicity curves (from Cioni et al. 2006).

(bottom). The *Album*-based procedure found slightly less than 80% of the Be stars known in NGC 330.

Fig. 4 suggests that our SMC survey technique detects  $H\alpha$  line emission, when the equivalent width is higher than



**Fig. 4.** Detection efficiency in equivalent width (top) and peak line strength relative to the continuum (bottom) of H $\alpha$  emission with WFI slitless spectra. The H $\alpha$  data are from Hummel et al. (1999, 2001) and Martayan et al. (2007a, 2008) for NGC 330 (black) and NGC 6611 (red). Emission-line stars detected in the WFI data are represented by filled circles, open squares denote the misses. Note that, contrary to the conventional definition, positive values indicate a net line emission.

10 Å or the peak intensity is more than twice the one of the underlying continuum, down to  $V \sim 16.5$ –17 mag, which corresponds to spectral types later than B2–B3 (see Martayan et al. 2007b). Note that, contrary to the conventional definition, positive values indicate a net line emission. For fainter stars, the signal-to-noise ratio is lower and the detection thresholds increase.

A further check is provided by the following: Martayan et al. (2007b) observed 31 WFI stars preselected from the emission-line stars found with the WFI in the field of NGC 330. At a spectral resolving power of 8,600 with the VLT, all of the 31 emission-line stars were confirmed as true H $\alpha$  emission-line objects, 28 of which could be classified as Be stars. The remaining 3 turned out to be of a different nature (compact planetary nebulae, supergiants, B[e] or Herbig B[e] stars).

The case of NGC 330 is also useful to guess the false-alarm probability, which evidently is low. For a more precise constraint, one would need to have a control sample with B/Be classifications that are true at the time of the WFI observations. This does not exist, and some

instrument-independent uncertainty is introduced by the comparison of observations made in different years because the Oe/Be/Ae characteristics of a star are (sometimes: highly) time dependent and not seldom only intermittently present.

#### 4. Astrometry, photometry, and spectral classification

For the detected emission-line stars to be put into an evolutionary context, intrinsic colours and magnitudes are needed. In the following subsections, they are derived separately for the WFI emission-line stars in the SMC and for a comparison data set in the Galaxy.

##### 4.1. WFI SMC data

As the largest homogeneous source of photometry in SMC clusters we chose OGLE (Udalski et al. 1998). The first step for the cross-identification is astrometry.

##### 4.1.1. Astrometry and correlation with OGLE

The ASTROM package (Wallace & Gray 2003) was applied to the extracted spectra of the -1st order. Per WFI image, 30 to 80 astrometric reference stars from the GSC2.2 and/or UCAC2, USNO catalogues were utilized. In this way, the coordinates of the 7,867 SMC stars mentioned in Sect. 3.1 (plus 55 in NGC 346) were determined with an accuracy of 0.5–1". Cross-correlating these WFI positions with the OGLE catalogues Udalski et al. (1998) revealed a systematic global offset of  $-0.3''$  in right ascension and  $+0.3''$  in declination. In order to maximize the probability of identifying the WFI emission-line stars in OGLE, these shifts were applied for the extraction of the photometric data from OGLE (note that the WFI coordinates provided in this paper do not include these offsets).

For each cluster, any multiple observations and identifications were merged into one per star. Table B.2 provides a summary of the results for each cluster. On average, 73.7% of all WFI stars and 79.7% of the WFI emission-line stars were found in OGLE. The incompleteness is explained mostly on the part of OGLE, which is undercomplete in crowded areas (i.e., clusters) and in the presence of extended nebulosities. But imperfect WFI coordinates also add their share. Note also that only about 80% of the  $\sim 3$  square degrees of this WFI survey are covered by OGLE II. This especially affects large complexes like the one of NGC 346.

##### 4.1.2. Photometric spectral classification

The resulting apparent colours and magnitudes need to be converted to absolute ones, and absolute luminosities and spectral types need to be derived so that inter-cluster comparisons within the SMC but also between SMC and Galaxy become possible.  $V_0$ ,  $(B-V)_0$ ,  $(V-I)_0$



were derived by means of the per-cluster  $E_{B-V}$  reddenings from Pietrzynski & Udalski (1999). The absolute  $M_V$  of each star was calculated from the resulting  $V_0$  and the SMC distance modulus provided by Udalski (2000). That is, for all clusters the same effective distance was adopted.

Using the HR diagramme in Fig. 5, the following regions were assumed to delineate the main sequence:

O stars:  $M_V < -4.2$  and  $-0.3 \leq (B-V)_0 \leq +0.1$  and  $-0.3 \leq (V-I)_0 \leq +0.3$

B stars:  $-4.2 \leq M_V \leq +0.43$  and  $-0.4 \leq (B-V)_0 \leq +0.1$  and  $-0.35 \leq (V-I)_0 \leq +0.2$

A stars:  $0.43 < M_V \leq 2.55$  and  $-0.4 \leq (B-V)_0 \leq +0.25$  and  $-0.38 \leq (V-I)_0 \leq +0.25$ .

Individual spectral types were assigned by applying the calibration of Lang (1992) and Wisniewski & Bjorkman (2006, and references therein) as shown in Table 1 and Fig. 5. The break-down of the full sample by spectral types and emission-line characteristics is given in Table 2.

Apart from the global uncertainties of spectral types derived from photometry, differential reddening across a cluster and erroneous membership assignments will introduce individual errors. However, they will only dilute but not probably falsify general trends derived from the database at large.

Sect. A.3 compares for 12 stars in NGC 346 spectral types derived as described above and spectroscopic classifications from the literature. The average difference only amounts to 1 spectral sub-type.

**Table 1.** Adopted ranges in absolute  $V$  magnitude per spectral sub-type, following the calibration of Lang (1992) and Wisniewski & Bjorkman (2006, and references therein) for main-sequence stars.

ST	Mv Range	ST	Mv Range
Hot O	<-6.0	B6	[-0.6; -0.25[
O3	[-6.0; -5.9[	B7	[-0.25; 0.025[
O4	[-5.9; -5.7[	B8	[0.025; 0.285[
O5	[-5.7; -5.5[	B9	[0.285; 0.43[
O6	[-5.5; -5.2[	A0	]0.43; 1.0[
O7	[-5.2; -4.9[	A1	[1.0; 1.3[
O8	[-4.9; -4.5[	A2	[1.3; 1.5[
O9	[-4.5; -4.2[	A3-A4	[1.5; 1.95[
B0	[-4.2; -3.25[	A5-A6	[1.95; 2.2[
B1	[-3.25; -2.55[	A7	[2.2; 2.4[
B2	[-2.55; -1.8[	A8-A9	[2.4; 2.55[
B3	[-1.8; -1.4[	F0-F1	[2.55; 3.6[
B4	[-1.4; -0.95[	cool F	$\geq 3.6$
B5	[-0.95; -0.6[		

The results of the photometric and spectral classification and much additional information are compiled in a number of tables. For basic data of Be stars and their absolute photometric data and spectral types, see Tables C.1 and C.2, respectively. For mere candidate-Be stars, Tables C.3 and C.4 are the equivalents. Tables C.5 and C.6 concern Oe and Ae stars. Emission-line objects well out-

side the main sequence are covered in Tables C.7 and C.8. Table C.9 compiles all WFI-based data (coordinates, etc.) for emission-line stars without counter part in the OGLE catalogues (Udalski et al. 1998). Where applicable, the tables also contain information extracted from SIMBAD within a search radius of 2'' about each emission-line star. Because of the high density of objects especially in the cluster cores, this information will inevitably suffer from misidentifications.

Similar tables for the 3,792 SMC non-emission line stars are available on request.

#### 4.2. Comparison data for the Galaxy

The most recent and comprehensive photometric survey for Be stars in Galactic clusters is the one by McSwain & Gies (2005). It comprises 52 definite Be stars and 116 Be candidates in 48 of the 54 clusters studied. Using data from McSwain et al. (2008), we estimate that the detection limit for H $\alpha$  line emission in that sample is 7 Å, similar to the one of our spectroscopic study in the SMC.

McSwain & Gies (2005) published the Stroemgren parameters  $y$ , (b-y), E(b-y) but not  $m_1$ . For a comparison with the SMC sample, the conversion to the Johnson UBV system was performed as follows:

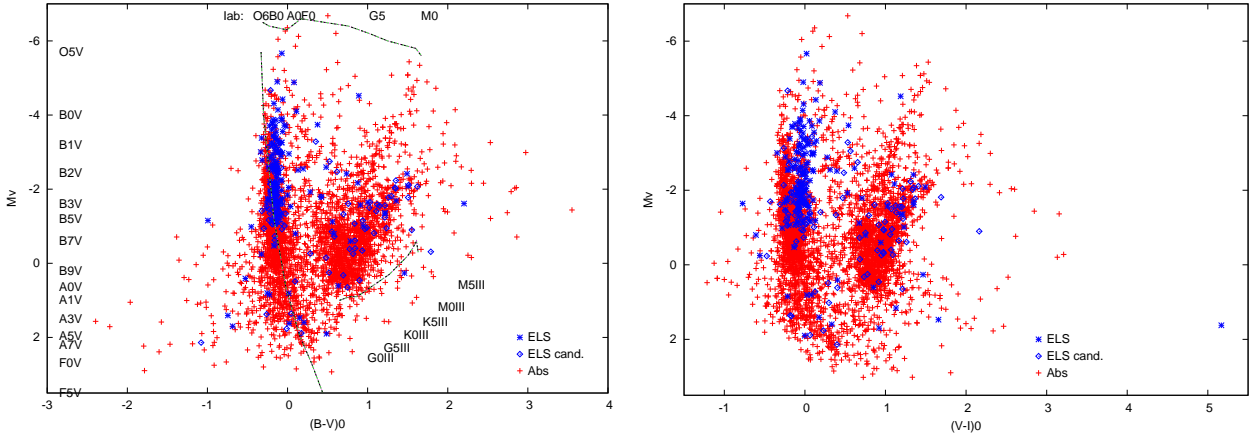
- First, (B-V) was derived from the relation Warren & Hesser (1977):  $(B-V) = 1.668 \times (b-y) - 0.030$
- Second, the  $y$  magnitudes given by McSwain & Gies (2005) in the system defined by Cousins (1987) transform to standard V magnitudes by means of the relation:  $V = y + 0.038 \times (B-V)$  (Cousins & Caldwell 1985).
- Third, E[B-V] results from  $E[B-V] = E[b-y] / 0.745$ , where E[b-y] is taken from McSwain & Gies (2005).
- Fourth,  $V_0$  follows from  $V_0 = V - 3.1 \times E[B-V]$ .
- Fifth, absolute magnitudes,  $M_V$ , were calculated from  $M_V = V_0 - \mu$ , using the distance moduli,  $\mu$ , given by McSwain & Gies (2005) for each cluster.
- Sixth,  $(B-V)_0 = (B-V) - E[B-V]$ .

From this point on, spectral types of main-sequence stars were derived in the same way as for the WFI SMC sample (Sect. 4.1.2).

## 5. Results and discussion

### 5.1. Topology of global HR diagrams

Reddening-free colour-magnitude diagrams incorporating all WFI stars in SMC clusters are shown in Fig. 5. Emission-line stars are found on, or close to, the main sequence, the red giant branch, and the asymptotic giant branch. As expected from Fig. 4, the number of stars



**Fig. 5.** Global colour-magnitude diagrams for stars in SMC open clusters. Left:  $B-V$ ; right:  $V-I$ , absolute  $V$  magnitude vs. dereddened colour. Red crosses (+) indicate non-emission line stars, blue asterisks (\*) mark emission-line stars (“ELS”), and candidate emission-line stars (“ELS cand.”) are plotted as diamonds. The spectral calibration sequences corresponding to the lines displayed in the figure are from Lang (1992).

**Table 2.** Breakdown of the WFI SMC sample (col. 2) and the Galactic sample from McSwain & Gies (2005) (col. 3) by numbers of open clusters, spectral types, and emission-line characteristics. ELS denotes emission-line stars. The first line after the titles gives the number of open clusters used.

Type	Number (SMC)	Number (Galaxy)
Open clusters	84	54
O	25	13
Oe+Oe?	6	3
B	1384	1741
Be	109	52
Be?	54	116
A	250	495
Ae+Ae?	7	57
Other non-ELS	2408	17845
ELS outside main sequence	90	
Unclassified ELS	49	
NGC 346 (Be, HBe, WR, etc)	55	
Total	4437	20322

seems to become visibly incomplete below  $V = 17$  mag (corresponding to  $M_V \simeq -2.1$ ).

The emission-line stars near the main sequence are mainly Be stars. While their spread in colour is not larger than the one of the apparent zero-age main sequence they are significantly displaced towards redder colours. This topology is discussed in more detail in Sect. 5.2.

An analogous diagram ( $M_V$  vs.  $(B-V)_0$ ) of the Galactic data from McSwain & Gies (2005) is depicted in Fig. 6.

For all open SMC clusters with emission line stars and data for a total of at least 10 stars, separate colour-magnitude diagrams are also available (see Figures D.1 to D.8 in Sect. D).

## 5.2. Colour excesses of emission-line stars

Table 3 collects the mean colour offset per spectral subtype between emission and non-emission line stars (separately for SMC and Galaxy). Not only are emission-line stars redder than non-emission line stars but they possibly even delineate a separate red sequence. This is already on average more prominent in  $(V-I)_0$  than in  $(B-V)_0$  but some individual stars deviate much more strongly in  $(V-I)$  than in  $(B-V)$ . In  $(B-V)$ , the Galactic Be stars seem to differ more strongly from the normal main sequence than in the SMC. Since for early-type stars the colour-magnitude diagrams are degenerate in colour, nothing can be said about any systematic differences in luminosity.

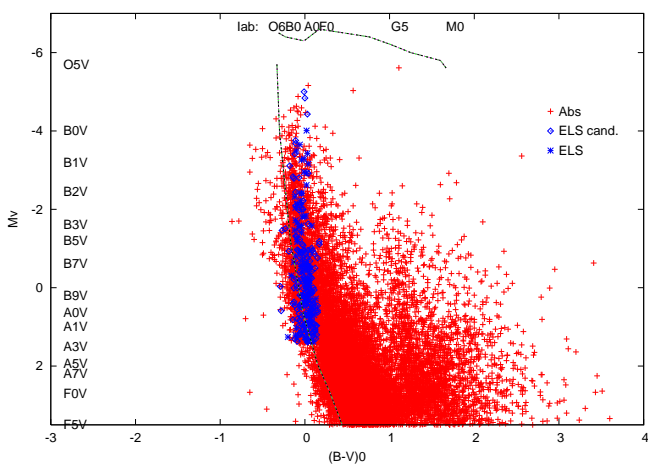
The excess reddening seems to reach a maximum around spectral types B0-B2 in both SMC and Galaxy. Figs. 7 and 8 illustrate the reddening excess between emission and non-emission line stars in  $(B-V)_0$  and  $(V-I)_0$  in the SMC and Galaxy. Similar segregations of Be and normal B stars were also found by Keller et al. (1999). This could be due to one or more of stellar evolution, light scattering in the circumstellar disk (Dachs et al. 1988), and gravitational darkening linked to the fast rotation of Be stars (Frémat et al. 2005). Of these, evolutionary differences are the least likely since the comparisons are made for stars in the same open clusters and for similar spectral type. (The evolutionary status is discussed in more detail in Sect. 5.6.)

This leaves fast rotation and circumstellar disks as candidate explanations of the extra reddening in Be stars: At low metallicity (SMC), Be stars seem to rotate faster than at high metallicity (Martayan et al. 2007b), so it is expected that the fast-rotation effects are larger in the SMC than in the Galaxy. In theory (Maeder & Meynet 2001), this is partly compensated by the radii of low-metallicity stars being smaller by 15 to 20 % which can affect the luminosity of the stars. On the other hand, work by Trundle

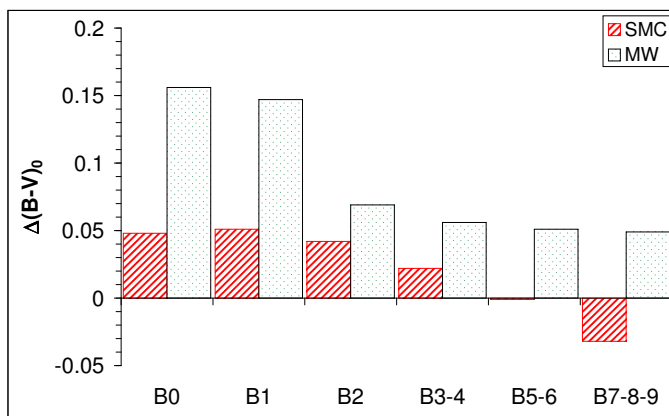


et al. (2007) and Evans et al. (2008), indicates that, in the SMC, the class V stars of a given spectral sub-type are hotter than their counterparts in the Galaxy. But their luminosity is about the same: for B0V,  $L_{SMC}/L_{MW}=0.9$ ; for B1V  $L_{SMC}/L_{MW}=1.01$ ; for B2V  $L_{SMC}/L_{MW}=1.04$ .

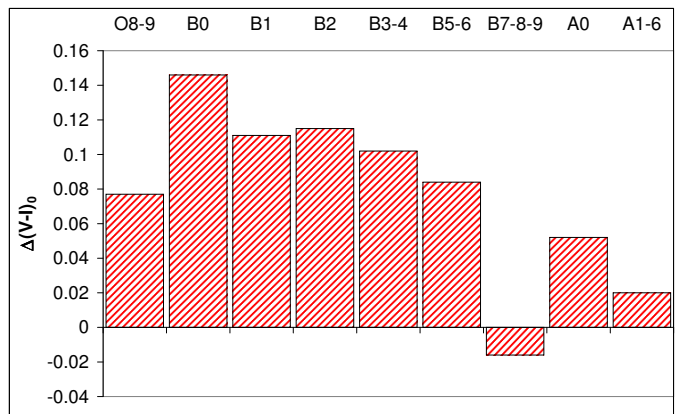
Circumstellar disks of Be stars have been reported (Wisniewski & Bjorkman 2006; Wisniewski et al. 2007a; Martayan et al. 2007a) to be closer to the central star at lower metallicity so that the circumstellar extinction towards low-inclination Be stars would be increased. But, as explained above, the radii of the stars are smaller, thereby partly offsetting the claimed difference in geometry.



**Fig. 6.** Global absolute  $V$  magnitude vs. dereddened  $(B - V)$  colour of the Galactic open cluster stars from McSwain & Gies (2005). The spectral calibration sequences corresponding to the lines displayed in the figure are from Lang (1992). The symbols are the same as in Fig. 5.



**Fig. 7.** Comparison between normal stars and emission-line star of the reddening excess in  $(B - V)_0$  in the SMC (left) and Galaxy (right, from data of McSwain & Gies 2005). Note that the sample is not complete starting with spectral type B3.



**Fig. 8.** Comparison between normal stars and emission-line star of the reddening excess in  $(V - I)_0$  in the SMC.

### 5.3. Frequency of Be stars as a function of local star density

Various studies in the Galaxy (for example Keller 2004) suggest that the rotational velocities of B stars are higher in open clusters than in the field. By contrast, investigations in the LMC and SMC using statistical tests (Martayan et al. 2006, 2007b) did not find significantly different rotational velocities in clusters and the field. In the Galaxy, Huang & Gies (2006) found more slow rotators in the field than in open clusters. They also concluded that the more massive B stars spin down during their main sequence phase and suggested that some of the rapid rotators found may have been spun up by mass-transfer in close binary systems. These authors ascribe the difference between open clusters and fields to a difference in the evolutionary phase of the stars (the older, the slower are the stars).

The same difference is attributed by Wolff et al. (2007) to the difference in number density. They argue that stars in low-density environments could retain their pre-main sequence disk for a longer time. Star-disk locking would, then, preserve the angular speed so that such stars cannot become young fast rotators.

However, the clusters studied are mainly young ones, among them NGC 6611. Martayan et al. (2008) have shown that in this cluster some early-type objects are still on the pre-main sequence. They also found that the rotational velocities of these two kinds of objects differ by about 20%, with ZAMS stars rotating more slowly. The theoretical models from Meynet & Maeder (2000) explain this decrease by an internal redistribution of the angular momentum at the ZAMS.

If a difference between the rotational velocity of cluster and field stars is not due to biased sampling of evolutionary effects but related to local stellar density, the expected frequency of Be stars should be higher in open clusters than in the field at large and also higher in higher-density fields. The WFI SMC database permits such a comparison to be made. This hypothesis will be checked in a following paper dealing with SMC field stars. Accordingly, the

**Table 3.** Averaged values of  $M_V$ ,  $(B-V)_0$  (cols. 3, 8),  $(V-I)_0$  (col. 5), and difference in colour index between emission and non-emission line stars (cols. 4 and 9 for  $(B-V)_0$  and col. 6 for  $(V-I)_0$ ). Cols. 8 and 9 provide data from McSwain & Gies (2005) stars in the Galaxy (“Galaxy”). Crude error estimates ( $1\sigma$ ) are 0.054 mag for the SMC  $(B-V)_0$  values, and 0.030 mag for the Galactic  $(B-V)_0$  values.

ST	$M_V$	$(B-V)_0$	$\Delta(B-V)_0$	$(V-I)_0$	$\Delta(V-I)_0$	N	Galaxy $(B-V)_0$	Galaxy $\Delta(B-V)_0$
O8-O9	-4.522	-0.123		-0.063		16	-0.227	
O8-O9e	-4.638	-0.098	0.025	0.014	0.077	5		
B0	-3.569	-0.190		-0.154		49	-0.286	
B0e	-3.569	-0.142	0.048	-0.008	0.146	27	-0.130	0.156
B1	-2.781	-0.211		-0.177		90	-0.238	
B1e	-2.799	-0.160	0.051	-0.066	0.111	37	-0.091	0.147
B2	-1.947	-0.190		-0.184		258	-0.238	
B2e	-1.934	-0.148	0.042	-0.069	0.115	56	-0.169	0.069
B3-4	-1.381	-0.174		-0.162		236	-0.209	
B3-4e	-1.414	-0.152	0.022	-0.060	0.102	22	-0.153	0.056
B5-6	-0.916	-0.156		-0.144		386	-0.194	
B5-6e	-1.050	-0.157	-0.001	-0.060	0.084	19	-0.143	0.051
B7-8-9	-0.193	-0.132		-0.114		365	-0.153	
B7-8-9e	-0.490	-0.164	-0.032	-0.130	-0.016	2	-0.104	-0.049
A0	0.718	-0.062		-0.088		116	-0.124	
A0e	0.820	-0.155	0.093	-0.036	0.052	3	-0.076	0.048
A1-6	1.432	-0.011		-0.034		129	-0.103	
A1-6e	1.596	-0.014	0.003	-0.014	0.020	4	-0.165:	-0.062

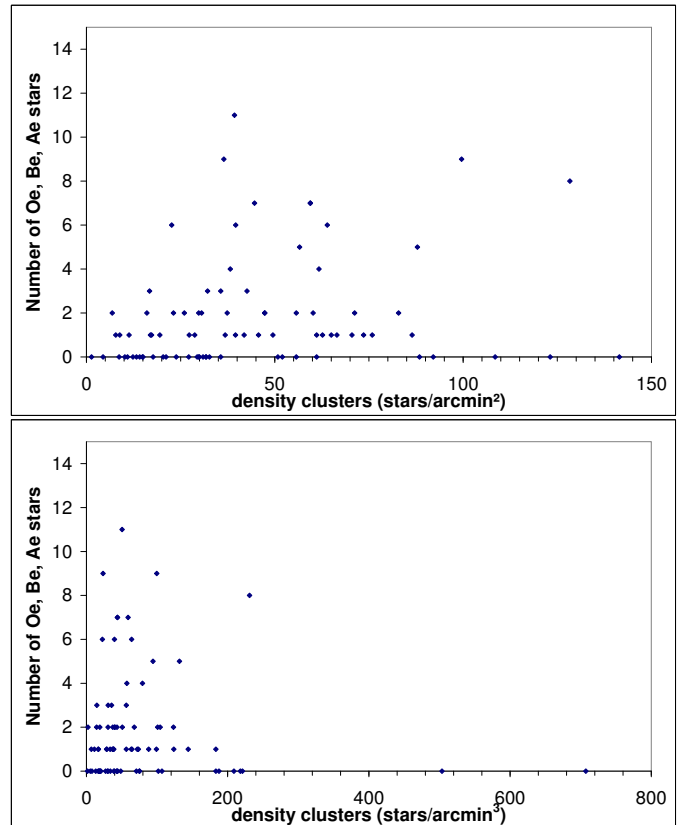
star surface and space density of each open cluster in the sample was calculated and compared to its contents of main-sequence emission-line stars (Oe, Be, Ae). No correlation became evident (Fig. 9), in agreement with the findings of McSwain & Gies (2005) for Galactic clusters.

#### 5.4. The Be phenomenon: SMC vs. Galaxy

In both galaxies, the fraction of near-main sequence Be stars varies drastically from one open cluster to the other but there is not even the beginning of an explanation of this very conspicuous (and well-known) fact. In order not to be misled by such small-number instabilities, all WFI SMC and all Galactic emission-line stars were combined to one sample each. The completeness with spectral type of these samples can be inferred from Fig. 10, which confirms that the SMC sample is incomplete towards fainter stars, i.e. later B sub-types, whereas in the Galaxy the increase toward later subtypes basically follows the Initial Mass Function (IMF).

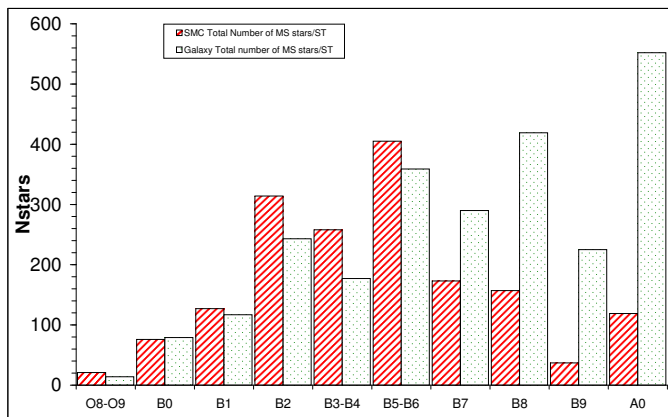
The global fractions of main-sequence Oe/Be/Ae stars per spectral sub-class are provided in Table 4. As Fig. 11 illustrates, the distributions have similar overall shapes. But with fractions reaching nearly 35%, early-type Be stars are more abundant in the SMC than in the Galaxy by a factor of 3-5. This factor drops to 2-4 if the very populous cluster NGC 330 is removed from the sample so that the overfrequency of Be stars among early spectral subtypes is robust. The recent slitless study of Mathew et al. (2008) reports similar Be-to-B star ratios in Galactic clusters as McSwain & Gies (2005) do.

Note that these three studies may be compared because they are all single-epoch studies. Since the Be phe-



**Fig. 9.** Number of emission-line stars (Oe, Be, Ae) vs. area (top) or volume (bottom) density of SMC open clusters.

nomenon is transient, the true frequency of Be stars must be higher than apparent from such surveys. The study by Fabregat (2003) suggests that up to one-third of all



**Fig. 10.** Global fractions of main-sequence stars with and without emission lines as a function of spectral type (from O to early A stars). Left bars: SMC; right bars: Galaxy (from McSwain & Gies 2005). Both are similar and appear shaped by the initial mass function. However, in the SMC data the cut-off due to incompleteness sets in quite visibly at earlier spectral types (brighter magnitudes).

Be stars may be missed at any one epoch. Studying the Galactic cluster NGC 3766, McSwain et al. (2008) even suggest that 25 to 50 % of the Be stars could be missed in a single-epoch spectroscopic survey. This is, of course, very much dependent on the nature and quality of the data. Note that is not known whether the volatility of emission lines is different in Galaxy and SMC. In the Galactic field, the variability of classical Be stars is significantly higher among the early spectral subtypes, to which the present study is limited.

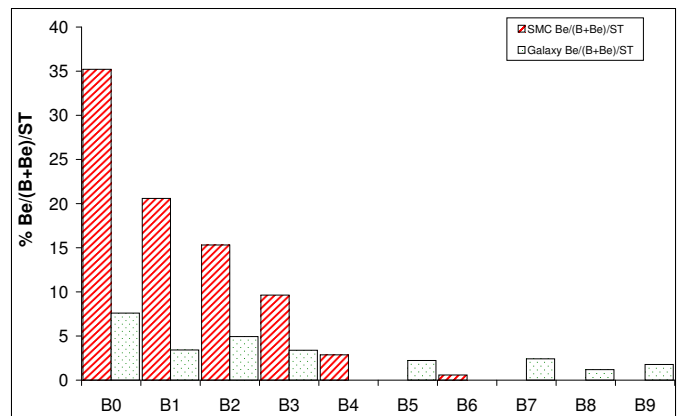
The inclusion of candidate Be stars (Table 4) does not much affect the distribution function in the SMC. However, for the Galactic late-type candidate-Be stars from McSwain & Gies (2005) there is a large increase. It is conceivably due to the difficulty of photometrically distinguishing pre-main sequence or Herbig Ae/Be stars from classical Be stars. The more frequent occurrence of these stars in young open clusters supports this interpretation.

### 5.5. The Be phenomenon as a function of spectral type

Fig. 12 presents the percentages per spectral sub-class, referred to the total sample of Be stars, but separately for SMC and Galaxy. The Galactic data are from Zorec & Frémat (2005), McSwain & Gies (2005), and Mathew et al. (2008). The distributions for the two galaxies are similar but the incompleteness of the SMC data becomes rather apparent beyond B2 (cf. Sect. 3.3) and prevents a more detailed comparison. The highest number of Be stars is encountered at spectral type B2 in both SMC and Galaxy. Because this coincides with the maximum of the H $\alpha$  emission-line strength (Zorec et al. 2007) while for lower line strengths the statistics are increasingly incomplete, it is questionable whether Fig. 12 reveals the real dependency of the Be phenomenon on effective temperature. At late spectral sub-classes, the more complete Galactic

**Table 4.** Number ratios of Be to (B+Be) stars as a function of spectral type in SMC and Galaxy. For each range in spectral type, the fractions of definite emission-line stars and the combination of definite and candidate emission-line stars are listed.

Spectral type	SMC %	SMC % without NGC 330	Galaxy %
O8-O9e	23.8	20.8	14.3
B0e	35.2	26.3	7.6
all B0e	36.1		12.7
B1e	20.6	16.7	3.4
all B1e	27.0		7.7
B2e	15.3	13.9	4.9
all B2e	19.9		7.8
B3e	9.6	8.9	3.4
all B3e	14.0		6.8
B4e	2.9	3.0	0.0
all B4e	7.6		0.0
B5e	0.0	0.0	2.2
all B5e	1.8		9.2
B6e	0.6	0.6	0.0
all B6e	1.2		0.0
B7e	0.0	0.0	2.4
all B7e	0.0		7.2
B8e	0.0	0.0	1.2
all B8e	0.0		9.3
B9e	0.0	0.0	1.8
all B9e	0.0		11.1
A0e	2.5	2.5	0.9

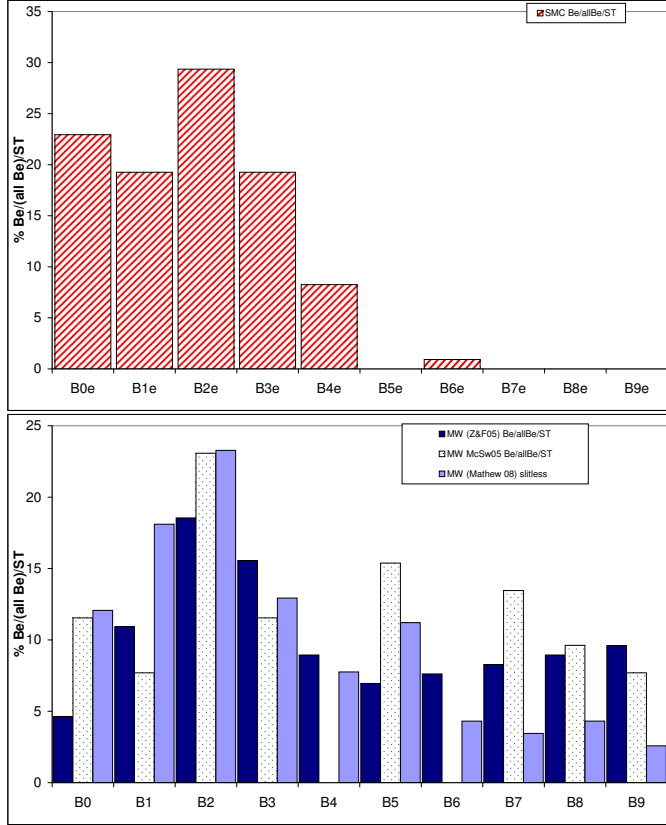


**Fig. 11.** The percentage of definite Be stars among all B-type (definite+candidate Be + B) stars vs. spectral type. Shaded bars: SMC, light bars: Galaxy.

data level off to a plateau as already shown by Kogure & Hirata (1982). As lined out by Zorec & Frémat (2005) and Zorec et al. (2007), this may be due to the combination of the decreasing relative frequency of Be stars and the absolute increase in the number of late B stars with the initial mass function.

Unlike in Fig. 11, the distribution in Fig. 12 does not drop very quickly with spectral type because the total

number of Be stars per spectral bin is crudely constant to within a factor of 2-3. This is not true for B-type stars at large because the IMF lets their numbers increase rapidly towards lower temperatures.

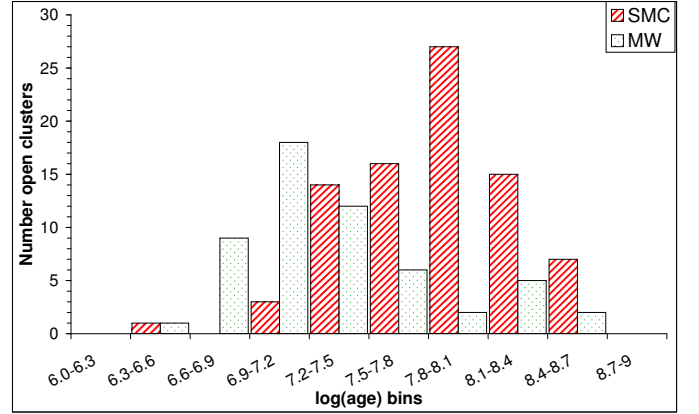


**Fig. 12.** The distribution of definite Be stars, as a percentage of the total number of Be stars in the sample, with spectral type in SMC (top, this paper, red dashed bars) and Galaxy (bottom). The data for the Galaxy are from Zorec & Frémat (2005, left blue bars), McSwain & Gies (2005, middle white bars), and Mathew et al. (2008, right, light blue bars).

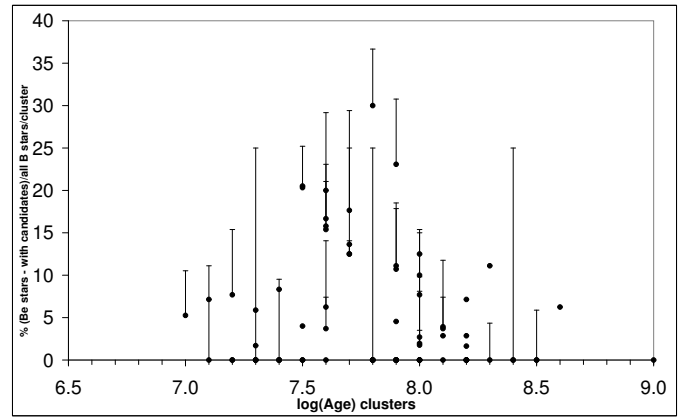
### 5.6. Evolution and age

Fig. 13 shows the distributions in age of open clusters of the SMC (Pietrzynski & Udalski 1999) and Galactic samples. In the SMC sample, there are more old open clusters than in the Galactic one although the stellar population of the Galaxy at large is older than the one of the SMC.

The number ratios of Be to B stars as a function of the age of open clusters in the SMC are shown in Fig. 14. For the Galaxy, see Fig. 4 of McSwain & Gies (2005). There is a maximum at  $\log(\text{age}) \sim 7.6$  in the SMC, while in the Galaxy no clear trend is seen. If taken at face value, there may be a small evolutionary enhancement of Be stars in the SMC. But a similar distribution may result already if the Be phenomenon peaks at a particular spectral subtype.



**Fig. 13.** The  $\log(\text{age})$  distributions of open clusters in SMC (left bars) and Galaxy (right bars, data from McSwain & Gies 2005).



**Fig. 14.** Number ratio of Be to B stars vs. cluster age in the SMC. The circles correspond to definite Be stars only, and the vertical bars extend the values by the respective candidate Be stars. In comparison, Fig. 4 of (McSwain & Gies 2005), which is the equivalent diagram for Galactic clusters, is basically flat with cluster age.

Similarly, Fig. 15 presents the ratios of open clusters with Be stars to all open clusters by age bins as defined by Mathew et al. (2008, their Fig. 8); the top panel is for definite Be stars, and the bottom panel combines definite and candidate Be stars. The comparison is made with data in the Galaxy from Mathew et al. (2008) and McSwain & Gies (2005). As noticed in the Galaxy by Mathew et al. (2008), there seems to be a first decrease of the number of open clusters with Be stars towards 30-40 Myears ( $\log(\text{age})=7.5-7.6$ ). Thereafter there is an increase during the evolution, and another decrease after 50-60 Myears ( $\log(\text{age})=7.7-7.8$ ). These 2 Figures (13 and 14) indicate that some Be stars could be born as Be stars (Wisniewski et al. 2007b), while others only assume Be characteristics during the evolution as mentioned by Fabregat & Torrejón (2000). The first decrease, if real (the differences between the studies are large), could be caused by Be stars reaching the terminal-age main sequence or by an evolutionary change of the angular velocities so that not every initial



Be star can sustain a high enough surface rotation rate to remain a Be star throughout its entire main sequence life (Martayan et al. 2007b).

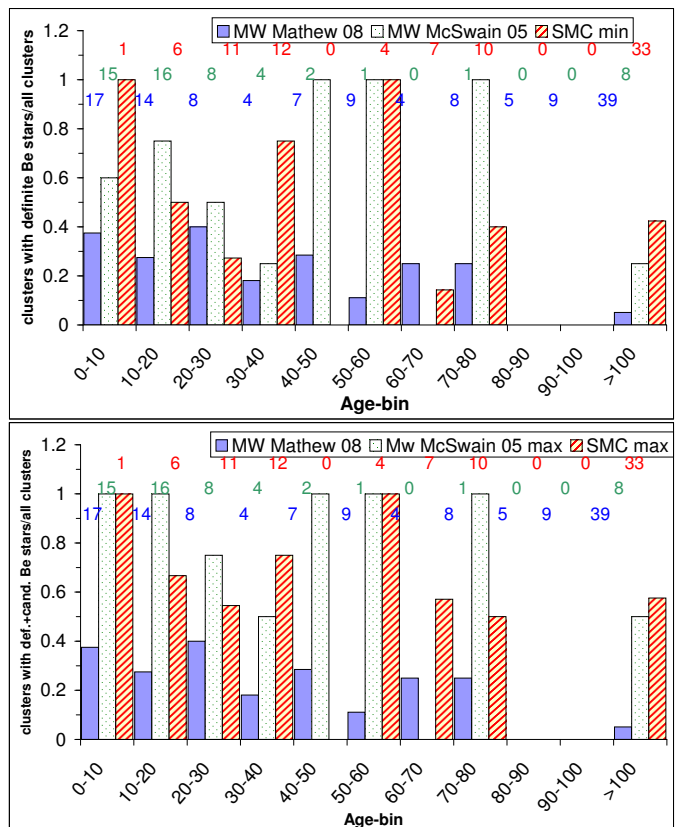
Moreover, for the Galaxy as well as low metallicity, respectively, Meynet & Maeder (2000) and Maeder & Meynet (2001) showed that, while the linear rotational velocity decreases with time, the fractional critical angular velocity ( $\Omega/\Omega_c$ ) increases. This holds for both medium and low-mass B-type stars over the range in metallicity studied and for massive B-O stars of low metallicity. But in massive Galactic-metallicity stars  $\Omega/\Omega_c$  actually decreases with age due to the larger losses in mass and angular momentum.

From observations of Galactic Be stars with  $\Omega/\Omega_c \geq 70\%$ , Martayan et al. (2007b, Fig. 11) reckon that massive Be stars lose their emission-line characteristics after few million years, while late-type Be stars begin to appear at 40% of their main sequence lifetime or nearly 40 million years. This is the age, at which (Fig. 15) the fraction of open clusters with Be stars begins to rise again. For SMC-like metallicity, Martayan et al. (2007b, Fig. 11) predict that massive and intermediate-mass Be stars appear between 3 and 5 million years. At intermediate cluster ages, the fraction of clusters hosting Be stars decreases because this massive population disappears when it reaches the TAMS. Finally, at an age of about 35-45 million years and SMC metallicity, late-type Be stars start to occur. This expectation, based on the evolution of  $\Omega/\Omega_c$  as a function of metallicity and mass, is qualitatively matched by the distribution in Fig. 15.

To investigate age dependencies further, Fig. 16 presents the range in  $\log(\text{age})$  of the host clusters as a function of spectral type (data from McSwain & Gies (2005); recall that the Be stars in the SMC were “selected as main sequence stars”). In the Galaxy, early-type Be stars are found close to the terminal-age main-sequence stars, intermediate-mass Be stars are mainly evolved, and definite late-Be stars are also evolved. The late-type candidate Be stars could be unevolved but there is a potential risk of confusion with pre-main sequence objects. Be stars seem to follow the evolutionary scheme described in Fabregat & Torrejón (2000), Zorec et al. (2005), and Martayan et al. (2007b), depending on their mass.

In the SMC, the OGLE ages (Pietrzynski & Udalski 1999) of some clusters are not really in agreement with their having very early-type stars (O-B0) as members. One example is Ogle-SMC72 with  $\log(\text{age})=7.6 \pm 0.2$  and containing 3 B0e stars although B0 stars reach the terminal-age main-sequence already at  $\log(t)=7$ .

On the other hand, Chiosi et al. (2006) derive  $\log(\text{age})=6.6 \pm 0.5$  for this cluster, which is fully consistent with B0e member stars. There are differences between the ages from Pietrzynski & Udalski (1999) and from Chiosi et al. (2006) also for other open clusters in the WFI sample, which could explain some of the discrepancies between individual spectral types and parent-cluster ages. Even though in some specific clusters the ages published



**Fig. 15.** Fraction per age bin of open clusters with Be stars in the Galaxy and SMC (following Fig. 8 of Mathew et al. 2008); top: definite Be stars, bottom: definite+candidate Be stars. The data for the Galaxy are from Mathew et al. (2008, left blue bars), McSwain & Gies (2005, middle white bars), and for the SMC (this study, right red bars). Numbers at the top show the absolute numbers represented by each bar.

by Chiosi et al. (2006) are in better agreement with the presence of Be stars, this is not generally the case.

If all OGLE ages from Pietrzynski & Udalski (1999) are taken at face value, 55% of the Be stars, which were selected as main sequence stars, could be younger than their host clusters. With the ages from Chiosi et al. (2006), this value reaches 62%. As the published error estimates are lower for Pietrzynski & Udalski (1999), their estimates were adopted. If the problem is not due to the assigned ages or to the TAMS calibration, all possible explanations for blue stragglers (e.g., multi-epoch or continuous star formation, mass-transfer binaries, etc.) are potential candidates. This hypothesis could be reinforced by the finding that Be/X-ray binaries are more abundant in the SMC than in the Galaxy according to Haberl & Sasaki (2000), who explain this result by different star-formation histories of the two galaxies.

On the other hand, the color-magnitude diagrams in Sect. D and the location of blue stragglers as delineated by Ahumada & Lapasset (2007) suggest that at most few Be stars lie in the blue-straggler zone while most Be stars are actually on the red side of the cluster main sequences. As

discussed in Sect. 5.2, this is probably unrelated to their age.

The other main sequence Be stars, located below the TAMS, are found evolved to the second part of the main sequence in agreement with the evolutionary picture sketched by Fabregat (2003) and Martayan et al. (2007b) for intermediate-mass Be stars in the SMC. The emission-line stars in NGC 346 could be classical Be stars but also pre-main sequence stars like Herbig Ae/Be stars. This would mostly affect the late spectral subtypes but at B0 some pre-main sequence stars are found as well (Nota et al. 2006).

Both in SMC and Galaxy, diagrams like Fig. 16 but for non-emission line B stars show a uniform distribution with age of the open clusters.

In the SMC, Be stars are mostly located in the region corresponding to the second half of the main sequence (except for some late-type stars in NGC 346 but they could be pre-main sequence stars), in agreement with the results of Fabregat & Torrejón (2000) and Martayan et al. (2007b). But the lack of open clusters with ages corresponding to the first half of the main sequence evolution of B-type stars makes it impossible to conclude that the Be phenomenon is *restricted* to the second half of the main-sequence evolution.

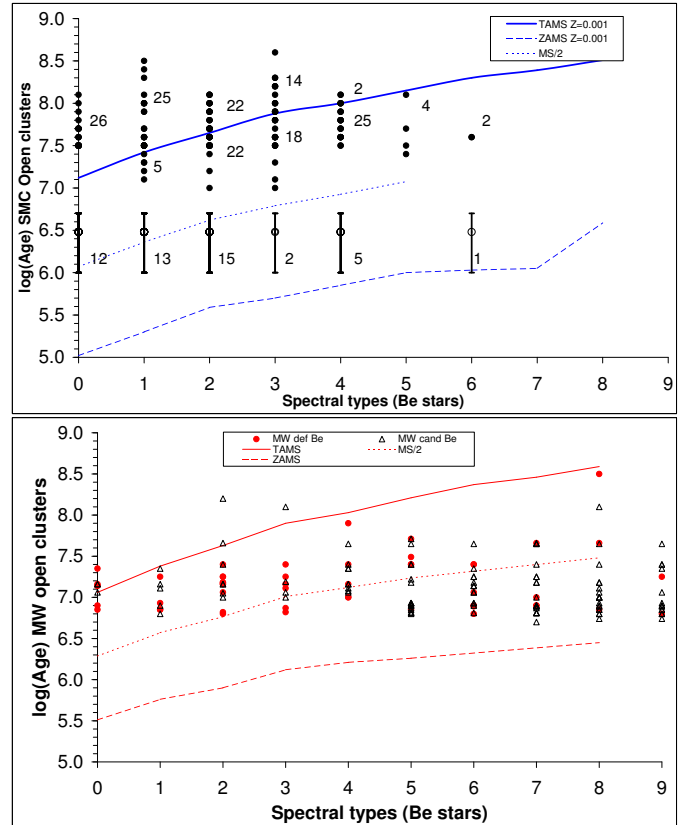
In the Galaxy, definite Be stars (red circles in Fig. 16, bottom panel) have mostly evolved to the second half of the main-sequence band as reported before by Fabregat & Torrejón (2000). The earliest (B0e) have already reached the TAMS. The locations of candidate and definite Be stars with early spectral types largely overlap. Towards later spectral sub-types, candidate Be stars could be less or even unevolved. But there is a risk of confusion with pre-main sequence objects. This uncertainty is smaller for definite Be stars.

To confirm the nature and better determine the evolutionary status of these Be stars, spectra with higher resolution and spectral coverage are required of both young and medium-aged open clusters in the SMC as well as the Galaxy.

A new result suggested by the present study is that in the SMC the Be phenomenon appears particularly enhanced towards hotter and more massive stars (O stars) than in the Galaxy. Because the losses of mass and angular momentum are lower in the SMC than in the Galaxy, this result is plausible and qualitatively consistent with the theoretical prediction from Maeder & Meynet (2001). However, these authors did not quantify the expected fractions of Oe or Be stars as a function of metallicity.

An important parameter to consider is  $\Omega/\Omega_c$ , the fractional critical angular rotation rate. If low-metallicity stars form with about the same initial angular momentum as more metal-rich stars of equal mass but have smaller radii on the main sequence, their  $\Omega/\Omega_c$  values must be higher.

Since the, then, expected higher relative frequency of Be stars is, in fact, higher in the SMC than in the Galaxy,  $\Omega/\Omega_c$  may be the parameter dominating the formation of rapidly rotating B stars. They may become Be stars just



**Fig. 16.** Spectral types of Be stars vs. log(age) of their host clusters in SMC (top) and Galaxy (bottom). The curves show terminal- and zero-age main sequence and the main-sequence half-age following Schaller et al. (1992, with  $Z=0.001$  for SMC and  $Z=0.020$  for the Galaxy). In the SMC, the numbers are the absolute numbers of stars in each spectral sub-type, and the open circles with large age error-bars correspond to the emission-line stars in NGC 346. In the Galaxy, the circles denote the definite Be stars and the triangles identify the candidate Be stars.

on account of their rapid rotation. Alternatively, the outbreak of the Be phenomenon may be helped by pulsation-assisted outbursts, which are triggered by the beating of two or more nonradial pulsations modes. In the Galaxy, only one such case has been found so far ( $\mu$  Cen, Rivinius et al. 1998). But several photometrically multiperiodic candidates were recently identified by Martayan et al. (2007a) and Diago et al. (2008) in the SMC. Moreover, the latter authors report an order of magnitude larger incidence of pulsations among Be stars than in B stars without emission lines.

In summary, the results of this work indicate that, at least for single stars, the Be phenomenon is coupled to (initial) mass, evolutionary stage, and metallicity. But it is not evident that these 3 parameters are primary quantities determining the prevalence of the Be phenomenon. A more physical description, in accordance with the above, is the one by Martayan et al. (2007b), who submit that the Be phenomenon depends primarily on the evolution of  $\Omega/\Omega_c$ .  $\Omega/\Omega_c$  is governed by evolutionary stage and metal-



licity but the dependencies are different in different mass domains, which leads to the confusing apparent lack of consistency or uniqueness of empirical studies of the Be phenomenon at large (the larger the area “imaged”, the more single trees seem to stand out).

## 6. Summary and conclusions

A slitless spectroscopic survey for emission-line objects in the SMC was performed. Fourteen fields covered most of the SMC. From 3 million spectra, about 8,120 spectra of 4,437 stars in 84 clusters and 14 nearby comparison fields were automatically selected. The final database comprises 122 definite main-sequence Oe/Be/Ae stars and 54 candidate emission-line stars, 1,659 main-sequence O/B/A stars, 2,408 other normal stars, and 90 emission-line stars not near the main sequence. Fifty-five emission-line stars in NGC 346 were also found and classified; but their nature - main sequence or pre-main sequence stars - is not clear so that they were not included in the statistics and analysis.

Cross-correlation with the OGLE database permitted these emission-line objects to be associated with homogeneous photometric data. For 49 additional emission-line stars photometric data could not be derived. While the survey is spatially homogeneous, it is starting to become incomplete around B3 (on the main sequence). For comparison, similar Galactic (but photometric) data from the work of McSwain & Gies (2005) were converted to the same scales in absolute luminosity and effective temperature.

Careful analysis led to the following conclusions:

- An intercomparison of clusters did not furnish any dependency of the relative frequency of emission-line stars on spatial density.
- In the SMC, the Be phenomenon is more strongly enhanced towards early-type stars (O stars) than in the Galaxy. Among early spectral sub-types, the fraction of Be stars in the SMC exceeds the one in the Galaxy by a factor of  $\sim 3$ -5.
- The largest number of Be stars is found at spectral type B2 both in SMC and Galaxy. Since also the emission-line strength is largest near B2, this result is difficult to interpret in the presence of low sensitivity to weak emission lines.
- In color-magnitude diagrams, most Be stars are found off the zero-age main sequence, with many of them defining a separate red “sequence”.
- The age distribution of clusters hosting Be stars shows that the Be phenomenon does cover the second half of the main-sequence evolution. Some Be stars may have formed as Be stars while others may have acquired their Be nature only during the course of their evolution. There are not enough young clusters in the SMC sample to say anything about the Be phenomenon during the first half of the main-sequence evolution of SMC stars.

- The observations are consistent with  $\Omega/\Omega_c$  being one of the main quantities governing the statistics of emission-line stars in all sub-samples of single stars.  $\Omega/\Omega_c$  rises slowly with time for intermediate and late B stars of all metallicities for massive B and O stars. The same holds for early-type B stars with SMC metallicity. Only massive Galactic OB stars are different in that their  $\Omega/\Omega_c$  decreases with time. When also evolution, initial mass, and metallicity are considered, the relative abundance of Be stars takes on a multi-parametric appearance. But  $\Omega/\Omega_c$  still dominates.

The above trends only stand out significantly in sufficiently large samples. Seemingly very similar, if not identical, small samples (e.g., single open star clusters) can differ drastically in their number of Be stars. To date, there is not even a speculative explanation for this. Maybe, a large variation in the initial distribution of rotation rates combined with a threshold in  $\Omega/\Omega_c$  plays a role.

In forthcoming articles, we shall present results of WFI slitless H $\alpha$  spectroscopy in the SMC field (outside clusters) and in open clusters and the field of the LMC. The nature of emission-line stars far from the main sequence will also be expanded on in a future paper.

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## Appendix A: Comments on individual open clusters

### A.1. NGC 330 (*Ogle-SMC107*)

NGC 330 is a well-studied open cluster known for its high content of Be stars (see for example Keller et al. 1999). The area covered by NGC 330 is the largest one of all clusters in this paper. A total of 400 spectra was examined and 55 emission-line stars were identified. Cross-matching with OGLE photometry provided indications that the majority of the latter are actually Be stars.

### A.2. Bruck 60 (*Ogle-SMC72*)

Bruck60 is one of the six SMC open clusters observed by Wisniewski & Bjorkman (2006). They found 26 Be stars, among them 6 candidates, within a radius of 1.5' while the present study extended over a radius of 35'' centered on the cluster. The two areas have 17 stars in common, of which *Album* rejected 8 highly blended sources. The detection rate of 9/17 stars is consistent with the estimated general extraction efficiency of 60% in the region of Bruch 60. Of the 9 detected stars (WBBe5, WBBe6, WBBe7, WBBe10, WBBe17, WBBe20, WBBe21, WBBe23, WBBe25), 2 (WBBe23 and WBBe25) are not properly separated and were also eliminated. Of the 7 remaining emission-line stars, 4 (WBBe5, WBBe10, WBBe17, WBBe20) are in common to both studies. One star (WBBe7), for which Wisniewski et al. (2007b) did not publish polarimetry, is found without emission. The two others (WBBe6 and WBBe21) are faint and have a too low S/N to provide a reliable conclusion about the presence of emission in their spectra. The stars poorly separated and/or with low S/N have V magnitudes of 17.4, 17.6, 18, and 18. Finally, the present study finds one candidate emission-line star not identified by Wisniewski & Bjorkman (2006).

### A.3. NGC 346

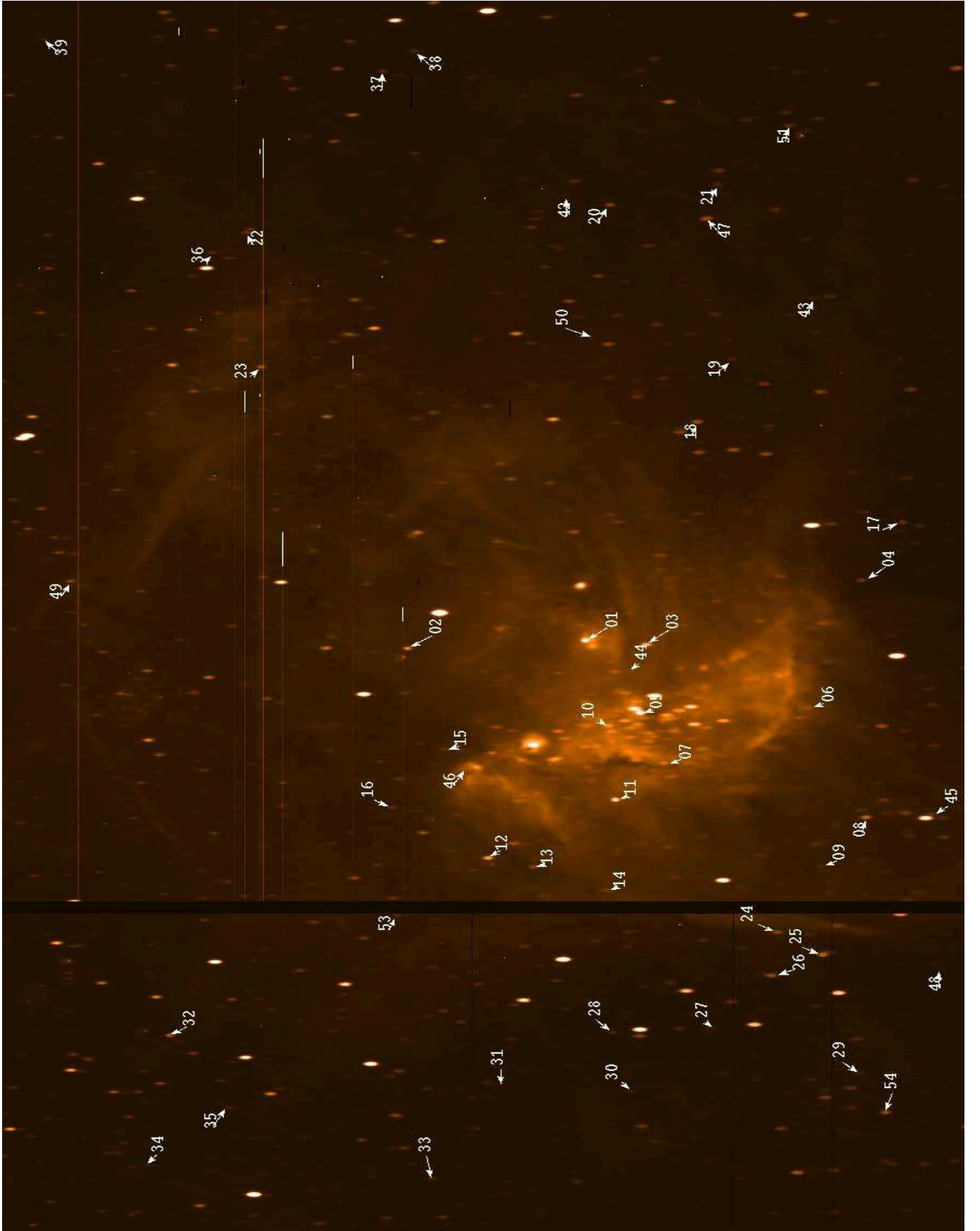
This open cluster is highly complex with various sub-aggregates. Bouret et al. (2003) published an age of 3 Myears and a metallicity of 0.004. However, Nota et al. (2006) found several populations with different ages: 4.5 Gyears for stars in the field, a young population with ages ranging from 3 to 5 Myears, in which stars with a mass less than 3  $M_{\odot}$  are still pre-main sequence stars, and a population with an intermediate age of 150 Myears.

In this open cluster and in its vicinity, we found 55 emission line stars. Dereddening with a global value of 0.008 mag for massive stars from Hennekemper et al. (2008) suggests that most of them are on the main sequence. The spectral classification obtained differs on average by 1 spectral sub-type for the 12 stars shared with spectral classifications by other authors.

Table A.1 provides basic parameters for the 55 emission-line stars in NGC 346 along with magnitudes from the EIS pre-flames survey (Momany et al. 2001), from DENIS (Epchein et al. 1994), and from 2MASS (Skrutskie et al. 2006). In Table A.2, other parameters are given as well as spectral classifications from WFI and other sources. Owing to the large spread in age of the stars in this cluster, some of them could be pre-main sequence stars. Where possible, cross-references to the studies by Hennekemper et al. (2008), Wisniewski & Bjorkman (2006), Wisniewski et al. (2007b), and Hunter et al. (2008) and to the Simbad database are, therefore, also included.

Because the distinction between pre-main sequence (Herbig Ae/Be or T Tauri stars), main-sequence (mostly classical Be stars), and post-main sequence emission-line stars (e.g., WR) requires more spectroscopic data with higher spectral resolution and coverage, but also membership in the different sub-clusters, the stars from NGC 346 were not included in the overall analyses of this paper. Their large number could have introduced biases.

Fig. A.1 shows part of a WFI image with NGC 346. Most of the emission-line stars are identified. For the central parts of the cluster(s) Hennekemper et al. (2008) report numerous pre-main sequence T Tauri stars, which are unfortunately too faint (see Fig. 4) to be detected by the present study. Fig. A.1 also illustrates the ability of the WFI slitless spectroscopy to distinguish true circumstellar line emission from diffuse nebular emission. In low-resolution short-slit spectra, the difference can be marginal.



**Fig. A.1.** Part of a WFI spectral image showing NGC 346 and its vicinity. The sources appear elongated due to their spectral nature. North is at the top, west to the right. The broad black vertical line is due to a gap between CCDs in the WFI mosaic. Arrows with numbers identify most of the emission-line stars, which can be found in Table A.1. This Figure shows that the slitless spectroscopy allows to find circumstellar (CS) emission-line stars while slit-spectroscopy cannot disentangle CS and nebular emission lines in diffuse emission nebulae. According to Hennekemper et al. (2008), there are many pre main sequence T Tauri stars in the central regions of the cluster. But they are too faint to be detected here.

**Table A.1.** Table 1 of emission-line star in NGC 346

ID	WFI	RA(2000)	DEC(2000)	RA(2000)	DEC(2000)	RA(2000)	DEC(2000)	B <sub>EIS</sub>	V <sub>EIS</sub>	I <sub>Denis</sub>	J <sub>2M</sub>	H <sub>2M</sub>	K <sub>2M</sub>
		WFI	WFI	2MASS	2MASS	EIS	EIS						
WFI[S11]	NGC 346-01	0 59 12.284	-72 9 58.45	0 59 12.23	-72 9 58.5	0 59 11.615	-72 9 57.52	14.818	15.072	-	14.152	14.381	13.046
WFI[S11]	NGC 346-02	0 59 28.866	-72 10 16.68	0 59 28.76	-72 10 16.7	0 59 28.750	-72 10 16.55	15.041	15.122	15.035	14.958	14.879	14.651
WFI[S11]	NGC 346-03	0 59 06.430	-72 9 56.35	0 59 06.33	-72 9 56.1	0 59 6.337	-72 9 56.06	14.131	14.281	14.496	14.551	14.525	14.283
WFI[S11]	NGC 346-04	0 58 47.641	-72 9 03.11	0 58 47.47	-72 9 03.0	0 58 47.525	-72 9 2.70	15.580	15.729	15.722	15.773	15.946	15.815
WFI[S11]	NGC 346-05	0 59 05.547	-72 10 35.68	0 59 05.43	-72 10 35.5	- - -	- - -	15.38 <sup>1</sup>	15.28 <sup>1</sup>	-	13.013	13.262	11.949
WFI[S11]	NGC 346-06	0 58 49.709	-72 10 19.86	0 58 49.55	-72 10 19.6	0 58 49.609	-72 10 19.52	15.780	15.889	16.098	15.498	15.368	15.327
WFI[S11]	NGC 346-07	0 59 02.093	-72 11 02.55	0 59 02.03	-72 11 02.5	0 59 2.056	-72 11 2.37	15.778	15.803	15.730	15.578	15.600	14.824
WFI[S11]	NGC 346-08	0 58 41.925	-72 11 18.16	0 58 41.80	-72 11 17.9	0 58 41.861	-72 11 17.55	14.849	14.919	14.982	14.891	14.593	14.707
WFI[S11]	NGC 346-09	0 58 45.074	-72 11 49.46	- - -	- - -	0 58 45.043	-72 11 48.98	16.684	16.806	-	-	-	-
WFI[S11]	NGC 346-10	0 59 08.214	-72 10 45.57	0 59 08.13	-72 10 45.4	0 59 8.141	-72 10 45.25	15.619	15.652	15.257	15.226	14.713	14.407
WFI[S11]	NGC 346-11	0 59 05.972	-72 11 27.42	0 59 05.88	-72 11 27.0	0 59 5.873	-72 11 26.98	16.125	15.863	15.107	14.557	13.892	12.808
WFI[S11]	NGC 346-12	0 59 16.683	-72 12 10.36	0 59 16.65	-72 12 10.2	0 59 16.613	-72 12 10.04	14.687	16.638	14.480	14.273	14.280	14.059
WFI[S11]	NGC 346-13	0 59 12.198	-72 12 12.03	0 59 12.14	-72 12 11.9	0 59 12.119	-72 12 11.69	15.926	15.874	15.659	15.631	15.249	15.300
WFI[S11]	NGC 346-14	0 59 04.794	-72 12 19.78	0 59 04.65	-72 12 19.7	0 59 4.613	-72 12 19.46	16.352	16.471	16.141	16.339	16.175	15.551
WFI[S11]	NGC 346-15	0 59 23.150	-72 11 11.41	0 59 23.08	-72 11 11.3	0 59 23.091	-72 11 11.32	16.313	16.554	-	16.416	16.339	14.471
WFI[S11]	NGC 346-16	0 59 26.818	-72 11 48.86	0 59 26.77	-72 11 48.8	0 59 26.718	-72 11 48.56	16.415	16.567	16.680	16.628	16.695	15.369
WFI[S11]	NGC 346-17	0 58 45.003	-72 8 26.92	0 58 44.86	-72 8 26.6	0 58 44.912	-72 8 26.41	16.136	16.158	15.994	15.967	15.644	15.411
WFI[S11]	NGC 346-18	0 59 06.540	-72 7 45.18	0 59 06.39	-72 7 45.2	0 59 6.382	-72 7 44.97	14.748	14.919	14.962	15.097	15.073	14.899
WFI[S11]	NGC 346-19	0 59 04.612	-72 7 06.70	0 59 04.46	-72 7 07.0	0 59 4.419	-72 7 6.52	16.423	16.584	16.645	16.654	17.039	16.875
WFI[S11]	NGC 346-20	0 59 19.462	-72 5 47.83	0 59 19.33	-72 5 48.0	0 59 19.283	-72 5 47.80	15.559	15.684	15.617	15.571	15.544	15.128
WFI[S11]	NGC 346-21	0 59 09.813	-72 5 27.92	0 59 09.78	-72 5 28.2	0 59 9.673	-72 5 27.78	16.483	16.589	16.480	16.386	16.142	15.439
WFI[S11]	NGC 346-22	0 59 53.038	-72 6 31.07	0 59 52.90	-72 6 31.1	0 59 52.925	-72 6 31.06	16.404	16.458	-	15.518	15.638	15.158
WFI[S11]	NGC 346-23	0 59 48.814	-72 7 47.02	0 59 48.69	-72 7 47.3	0 59 48.680	-72 7 46.97	15.864	15.866	15.575	15.730	15.527	15.328
WFI[S11]	NGC 346-24	0 58 47.609	-72 12 36.66	0 58 47.43	-72 12 36.8	0 58 47.499	-72 12 36.57	15.263	15.471	15.735	15.393	15.193	14.938
WFI[S11]	NGC 346-25	0 58 42.821	-72 12 46.02	- - -	- - -	0 58 42.719	-72 12 45.83	14.840	14.961	14.617	-	-	-
WFI[S11]	NGC 346-26	0 58 47.215	-72 13 01.68	- - -	- - -	0 58 47.104	-72 13 1.57	14.662	14.781	14.562	-	-	-
WFI[S11]	NGC 346-27	0 58 51.670	-72 13 36.21	- - -	- - -	0 58 51.518	-72 13 36.01	16.993	17.069	17.143	-	-	-
WFI[S11]	NGC 346-28	0 59 00.971	-72 13 46.43	0 59 00.87	-72 13 46.5	0 59 0.873	-72 13 46.39	16.960	16.873	16.578	16.241	15.895	15.066
WFI[S11]	NGC 346-29	0 58 36.753	-72 13 51.03	- - -	- - -	0 58 36.599	-72 13 50.79	16.673	16.903	16.952	-	-	-
WFI[S11]	NGC 346-30	0 58 58.031	-72 14 18.79	- - -	- - -	0 58 57.922	-72 14 18.69	17.116	17.201	-	-	-	-

Table A.1. continued

ID	WFI	RA(2000)	DEC(2000)	RA(2000)	DEC(2000)	RA(2000)	DEC(2000)	$B_{EIS}$	$V_{EIS}$	$I_{Denis}$	$J_{2M}$	$H_{2M}$	$K_{2M}$
		WFI	WFI	2MASS	2MASS	EIS	EIS						
WFI[S11]	NGC 346-31	0 59 10.243	-72 14 24.83	---	---	0 59 10.147	-72 14 24.68	17.571	17.700	17.526	-	-	-
WFI[S11]	NGC 346-32	0 59 42.773	-72 14 22.03	0 59 42.73	-72 14 22.2	0 59 42.713	-72 14 21.88	15.370	15.526	15.205	15.193	15.041	14.753
WFI[S11]	NGC 346-33	0 59 14.828	-72 15 23.78	0 59 14.72	-72 15 23.8	0 59 14.723	-72 15 23.59	16.542	16.623	16.442	16.201	16.435	16.007
WFI[S11]	NGC 346-34	0 59 42.097	-72 15 37.94	---	---	0 59 42.048	-72 15 37.68	17.300	17.412	17.315	-	-	-
WFI[S11]	NGC 346-35	0 59 35.677	-72 14 58.81	---	---	0 59 35.597	-72 14 58.63	16.869	17.030	17.042	-	-	-
WFI[S11]	NGC 346-36	0 59 55.900	-72 6 45.42	0 59 55.79	-72 6 45.5	---	---	14.61 <sup>1</sup>	14.39 <sup>1</sup>	15.934	15.969	15.938	15.183
WFI[S11]	NGC 346-37	0 59 43.714	-72 4 48.81	0 59 43.56	-72 4 49.2	0 59 43.564	-72 4 48.75	16.143	16.299	16.185	16.402	15.668	15.082
WFI[S11]	NGC 346-38	0 59 41.155	-72 4 34.93	0 59 41.12	-72 4 34.9	0 59 41.004	-72 4 34.88	16.290	16.402	16.138	16.324	15.714	15.806
WFI[S11]	NGC 346-39	1 00 16.196	-72 04 56.22	---	---	1 0 16.125	-72 4 55.81	16.966	17.151	-	-	-	-
WFI[S11]	NGC 346-40	0 59 58.161	-72 04 04.95	---	---	0 59 58.015	-72 4 4.83	16.925	17.047	17.040	-	-	-
WFI[S11]	NGC 346-41	0 59 33.396	-72 02 21.80	---	---	0 59 33.203	-72 2 21.50	16.616	16.786	16.888	-	-	-
WFI[S11]	NGC 346-42	0 59 23.963	-72 05 46.42	---	---	0 59 23.787	-72 5 46.37	-	17.625	17.689	-	-	-
WFI[S11]	NGC 346-43	0 58 58.183	-72 06 25.49	---	---	0 58 58.002	-72 6 25.13	16.571	16.723	16.556	-	-	-
WFI[S11]	NGC 346-44	0 59 07.577	-72 10 12.96	---	---	0 59 7.413	-72 10 12.82	17.623	17.749	-	-	-	-
WFI[S11]	NGC 346-45	0 58 35.686	-72 11 10.86	---	---	---	---	16.20 <sup>1</sup>	16.29 <sup>1</sup>	-	-	-	-
WFI[S11]	NGC 346-46	0 59 20.713	-72 11 21.51	---	---	---	---	18.37 <sup>1</sup>	18.63 <sup>1</sup>	-	-	-	-
WFI[S11]	NGC 346-47	0 59 10.076	-72 5 48.40	0 59 09.98	-72 5 48.5	0 59 9.933	-72 5 48.21	14.184	14.479	14.593	14.933	14.978	15.031
WFI[S11]	NGC 346-48	0 58 31.435	-72 12 44.87	---	---	0 58 31.241	-72 12 44.81	17.640	17.746	-	-	-	-
WFI[S11]	NGC 346-49	1 0 02.121	-72 10 03.75	1 0 02.09	-72 10 03.8	1 0 2.062	-72 10 3.59	15.784	15.947	15.821	16.003	15.697	15.115
WFI[S11]	NGC 346-50	0 59 18.221	-72 07 04.26	---	---	0 59 18.103	-72 7 4.32	17.843	17.973	-	-	-	-
WFI[S11]	NGC 346-51	0 59 4.141	-72 4 48.72	0 59 4.2	-72 4 48.8	0 59 4.141	-72 4 48.72	15.601	15.772	16.077	16.2	15.882	15.332
WFI[S11]	NGC 346-52	0 59 6.487	-72 2 37.27	0 59 6.51	-72 2 37.5	0 59 6.487	-72 2 37.27	14.987	14.415	13.674	13.234	12.92	12.824
WFI[S11]	NGC 346-53	0 59 26.460	-72 13 11.78	0 59 26.51	-72 13 11.9	0 59 26.460	-72 13 11.78	15.262	15.382	15.713	15.883	15.947	16.793
WFI[S11]	NGC 346-54	0 58 33.256	-72 14 10.95	0 58 33.21	-72 14 11.2	0 58 33.253	-72 14 10.92	15.627	15.28 <sup>1</sup>	15.266	15.233	15.26	14.834
WFI[S11]	NGC 346-55	0 59 26.523	-72 9 54.06	0 59 26.57	-72 9 54.1	0 59 26.513	-72 9 53.84	11.619	11.5 <sup>1</sup>	11.029	11.111	11.006	10.769

<sup>1</sup>: from Simbad



**Table A.2.** Table 2 of emission-line star in NGC 346: the other classification of stars come from Hunter et al. (2008,VFS), Wisniewski et al. (2007b,WB07), Nota et al. (2006,spitzer), and Hennekemper et al. (2008,H08)

Id WFI	Id EIS	Id Simbad	(B-V)	E[B-V] from H08	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	ST WFI	class Simbad	class VFS	class WB07	class Spitzer	class H08
NGC 346-01	SMC5_089286	KWBBBe448	-0.254	0.08	-0.334	14.82	-3.93	B0:	-			N28, class I	
NGC 346-02	SMC5_056563	KWBBBe248	-0.081	0.22	-0.301	14.44	-4.31	O9:	B0V		Be(2)		B0V (19)
NGC 346-03	SMC5_030226	MPG482	-0.150	0.18	-0.330	13.72	-5.03	O7:	B0.5V:				B0.5V (14)
NGC 346-04	SMC5_083005	KWBBBe379	-0.149	0.08	-0.229	15.48	-3.27	B0:	-	B3e	not Be(3)	N69, class III	
NGC 346-05	-	MPG454	0.100	0.08	0.020	15.03	-3.72	B0:	-				
NGC 346-06	SMC5_029906	NMC47	-0.109	0.08	-0.189	15.64	-3.11	B1:	B1V	B1Ve		N6, class III	
NGC 346-07	SMC5_029282	KWBBBe191	-0.025	0.08	-0.105	15.56	-3.20	B1:	-		Be(1.5)		
NGC 346-08	SMC5_029130	NMC45	-0.070	0.08	-0.150	14.67	-4.08	B0:	B0.2e	B0.2e	Be(2)		
NGC 346-09	SMC5_028674	MPG208	-0.122	0.08	-0.202	16.56	-2.19	B2:	-				
NGC 346-10	SMC5_029509	KWBBBe212	-0.033	0.08	-0.113	15.40	-3.35	B0:	-			N90?, class II	
NGC 346-11	SMC5_081533	KWBBBe200	0.262	0.08	0.182	15.62	-3.14	B1:	Be		notBe, B[e]		
NGC 346-12	SMC5_055483	KWBBBe93	-1.951	0.08	-2.031	16.39	-2.36	B2 <sup>1</sup> :	-		Be(1)		
NGC 346-13	SMC5_055468	KWBBBe445	0.052	0.08	-0.028	15.63	-3.12	B1:	B2e	B2e	Be(1.5)		
NGC 346-14	SMC5_078460	KWBBBe807	-0.119	0.08	-0.199	16.22	-2.53	B1:	-		Be(2)		
NGC 346-15	SMC5_188572	KWBBBe908	-0.241	0.08	-0.321	16.31	-2.44	B2:	-		Be(2)		
NGC 346-16	SMC5_028654	KWBBBe921	-0.152	0.08	-0.232	16.32	-2.43	B2:	-				
NGC 346-17	SMC5_006366	KWBBBe374	-0.022	0.08	-0.102	15.91	-2.84	B1:	-		Be(1.5)		
NGC 346-18	SMC5_078074	KWBBBe205	-0.171	0.08	-0.251	14.67	-4.08	B0:	-	B2esh	Be(2)		
NGC 346-19	SMC5_006627	KWBBBe814	-0.161	0.08	-0.241	16.34	-2.41	B2:	-		Be(2)		
NGC 346-20	SMC5_033513	KWBBBe236	-0.125	0.08	-0.205	15.44	-3.31	B0:	B0.5esh	B0.5esh	Be(1)		
NGC 346-21	SMC5_006934	KWBBBe856	-0.106	0.08	-0.186	16.34	-2.41	B2:	-		Be(2)		
NGC 346-22	SMC5_032946	-	-0.054	0.08	-0.134	16.21	-2.54	B1:	-				
NGC 346-23	SMC5_031915	KWBBBe266	-0.002	0.08	-0.082	15.62	-3.13	B1:	-		Be(2)		
NGC 346-24	SMC5_028019	KWBBBe377	-0.208	0.08	-0.288	15.22	-3.53	B0:	Be	B3esh	Be(2)		
NGC 346-25	SMC5_079464	KWBBBe171	-0.121	0.08	-0.201	14.71	-4.04	B0:	Em		Be(2)		
NGC 346-26	SMC5_038701	MPG217	-0.119	0.08	-0.199	14.53	-4.22	O9:	O9.5IIIe	09.5IIIe			
NGC 346-27	SMC5_054519	-	-0.076	0.08	-0.156	16.82	-1.93	B2:	-				
NGC 346-28	SMC5_054474	KWBBBe778	0.087	0.08	0.007	16.63	-2.13	B2:	-				
NGC 346-29	SMC5_092842	-	-0.230	0.08	-0.310	16.66	-2.10	B2:	-				
NGC 346-30	SMC5_026531	-	-0.085	0.08	-0.165	16.95	-1.80	B3:	-				

Table A.2. continued

Id WFI	Id EIS	Id Simbad	(B-V)	E[B-V] from H08	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	ST WFI	class Simbad	class VFS	class WB07	class Spitzer	class H08
NGC 346-31	SMC5_061961	-	-0.129	0.08	-0.209	17.45	-1.30	B4:	-				
NGC 346-32	SMC5_005173	KWBBe259	-0.156	0.08	-0.236	15.28	-3.47	B0:	Be		Be(2)		
NGC 346-33	SMC5_068413	-	-0.081	0.08	-0.161	16.38	-2.38	B2:	-				
NGC 346-34	SMC5_068336	-	-0.112	0.08	-0.192	17.16	-1.59	B3:	-				
NGC 346-35	SMC5_053538	-	-0.161	0.08	-0.241	16.78	-1.97	B2:	-				
NGC 346-36	-	SMC47551	0.220	0.08	0.140	14.14	-4.61	O8:	-				
NGC 346-37	SMC5_007036	[MA93]1161	-0.156	0.08	-0.236	16.05	-2.70	B1:	-				
NGC 346-38	SMC5_081044	[MA93]1160	-0.112	0.08	-0.192	16.15	-2.60	B1:	-				
NGC 346-39	SMC5_034165	-	-0.185	0.08	-0.265	16.90	-1.85	B2:	-				
NGC 346-40	SMC5_034799	-	-0.122	0.08	-0.202	16.80	-1.95	B2:	-				
NGC 346-41	SMC5_007493	[MA93]1154	-0.170	0.08	-0.250	16.54	-2.21	B2:	-				
NGC 346-42	SMC5_228705	-	-	0.08	-	17.38	-1.37	B4:?	-				
NGC 346-43	SMC5_033051	-	-0.152	0.08	-0.232	16.48	-2.28	B2:	-				
NGC 346-44	SMC5_069688	MPG498	-0.126	0.08	-0.206	17.50	-1.25	B4:	-				
NGC 346-45	-	KWBBe350	-0.090	0.08	-0.170	16.04	-2.71	B1:	-		Be(2)		
NGC 346-46	-	MPG698	-0.260	0.08	-0.340	18.38	-0.37	B6:	-				HBe?(12)
NGC 346-47	SMC5_033514	KWBBe89	-0.295	0.08	-0.375	14.23	-4.52	O8:	O7Iab		Be(2)		
NGC 346-48	SMC5_055109	MPG108	-0.106	0.08	-0.186	17.50	-1.25	B4:	-				
NGC 346-49	SMC5_030040	KWBBe543	-0.163	0.08	-0.243	15.70	-3.05	B1:	Em				
NGC 346-50	SMC5_058373	-	-0.130	0.08	-0.210	17.73	-1.03	B4:	-				
NGC 346-51	SMC5_076404	-	-0.171	0.08	-0.251	15.52	-3.23	B1:	-		B0Ve-bin		
NGC 346-52	SMC5_035903	-	0.572	0.08	0.492	14.17	-4.58	O8 <sup>1</sup> :	-				
NGC 346-53	SMC5_081656	MPG753	-0.120	0.08	-0.200	15.13	-3.62	B0:	B1II		B1II		
NGC 346-54	SMC5_179751	KWBBe152	0.347	0.08	0.267	15.03	-3.72	B0:	Em		Be(2)		
NGC 346-55	SMC5_207758	HD5980	0.119	0.08	0.039	11.25	-7.50	WR	WR, EB, WN <sub>p</sub>		notBe		

<sup>1</sup>: not main sequence

**Appendix B: Open clusters: tables**

Table B.1 lists all open SMC clusters with their basic properties as well as the WFI field(s) covering it. Also shown are the numbers and types of emission-line stars found in each WFI image. The results after merger of multiple observations are contained in Table B.2.

**Table B.1.** Data for individual observations of open clusters in the SMC. Several open clusters were observed twice or three times in different images at different locations. For each cluster, we give the central coordinates, the  $\log(\text{Age})$  from Pietrzynski & Udalski (1999). The radii used in this study is generally equal to  $1.5\times$  the radii from Pietrzynski & Udalski (1999). The area of metallicity from Cioni et al. (2006) is given. For each observations, we provide in cols. 8, 9, 10, the number of all kind of stars, of emission-line star, and candidate emission-line star. In col. 11, there is the sum of emission-line star and candidate emission-line star. In col. 12, there is the ratio of all emission-line star to all stars. The other next columns give the number of stars for each category found in Ogle catalogues (Udalski et al. 1998). After a comment about the open clusters, we provide the ratio of number of WFI stars found in Ogle and emission-line star from WFI found in Ogle

Cluster	Image	RA(2000)	DEC(2000)	r	$\log(t)$	Z	$a_{\text{N}^*}$	$c$	$d$	$b$	$b/a$	Ntot	NELS	NELS?	comments	N*	ELS
	WFI			"				NELS	NELS?	c+d	%	ogle	ogle	ogle		ogle/wfi	ogle/wfi
SMC002	2	0 37 33.1	-73 36 42.6	58	8.4	0.003-0.006	26	0	1	1	3.8	26	0	1		100.0	100.0
SMC008	2	0 40 30.54	-73 24 10.4	53	8.0	0.003-0.006	103	3	3	6	5.8	102	3	3		99.0	100.0
SMC008	4	0 40 30.54	-73 24 10.4	53	8.0	0.003-0.006	59	1	1	2	3.4	59	1	1		100.0	100.0
SMC009	2	0 40 44.11	-73 23 0.2	45	8.0	0.003-0.006	73	2	2	4	5.5	64	1	2		87.7	75.0
SMC011	1	0 41 6.16	-73 21 7.1	45	7.9	0.003-0.006	36	0	2	2	5.6	33	0	2		91.7	100.0
SMC011	2	0 41 6.16	-73 21 7.1	45	7.9	0.003-0.006	65	3	2	5	7.7	64	3	2		98.5	100.0
SMC012	1	0 41 23.78	-72 53 27.1	76	>9	0.006-0.009	151	0	2	2	1.3	65	0	0	very old	43.0	0.0
SMC015	1	0 42 54.13	-73 17 37	37	8.1	0.003-0.006	88	1	3	4	4.5	78	1	3		88.6	100.0
SMC015	2	0 42 54.13	-73 17 37	38	8.1	0.003-0.006	79	1	1	2	2.5	52	1	1		65.8	100.0
SMC016	1	0 42 58.46	-73 10 7.2	53	8.3	0.003-0.006	119	0	1	1	0.8	115	0	1		96.6	100.0
SMC017	2	0 43 32.74	-73 26 25.4	32	7.9	0.003-0.006	74	1	0	1	1.4	64	1	0	1	86.5	100.0
SMC018	2	0 43 37.57	-73 26 37.9	32	7.9	0.003-0.006	64	1	0	1	1.6	57	1	0	1	89.1	100.0
SMC019	1	0 43 37.59	-72 57 30.9	15	8.6	0.003-0.006	10	0	0	0	0.0	9	0	0		90.0	-
SMC020	1	0 43 37.89	-72 58 48.3	12	8.6	0.003-0.006	7	0	0	0	0.0	7	0	0		100.0	-
SMC025	4	0 45 13.88	-73 13 9.2	19	8.0	0.003-0.006	30	0	0	0	0.0	29	0	0		96.7	-
SMC032	4	0 45 54.33	-73 30 24.2	37	8.0	0.003-0.006	41	0	0	0	0.0	41	0	0		100.0	-
SMC033	4	0 46 12.26	-73 23 34	23	7.2	0.003-0.006	10	0	1	1	10.0	9	0	1		90.0	100.0
SMC038	4	0 47 6.15	-73 15 24.9	26	8.1	0.003-0.006	64	0	0	0	0.0	64	0	0		100.0	-
SMC039	4	0 47 11.61	-73 28 38.1	61	8.0	0.003-0.006	197	3	1	4	2.0	176	3	1		89.3	100.0
SMC039	6	0 47 11.61	-73 28 38.1	61	8.0	0.003-0.006	93	4	6	10	10.8	93	4	6		100.0	100.0
SMC043	4	0 47 52.38	-73 13 20.3	27	8.5	0.003-0.006	63	1	1	2	3.2	55	1	1		87.3	100.0
SMC047	5	0 48 28.14	-72 59 0.3	45	7.8	0.003-0.006	24	1	2	3	12.5	19	0	2		79.2	66.7
SMC049	6	0 48 37.47	-73 24 53.2	47	7.0	0.003-0.006	88	2	5	7	8.0	62	2	4		70.5	85.7
SMC054	6	0 49 17.6	-73 22 19.8	34	8.0	0.003-0.006	46	3	2	5	10.9	43	3	2		93.5	100.0
SMC059	5	0 50 16.06	-73 1 59.6	31	7.8	0.003-0.006	25	0	0	0	0.0	25	0	0		100.0	-
SMC061	6	0 50 0.26	-73 15 17.7	26	7.4	0.003-0.006	44	1	4	5	11.4	42	1	4		95.5	100.0
SMC064	5	0 50 39.55	-72 57 54.8	45	8.1	0.003-0.006	117	4	4	8	6.8	112	3	4		95.7	87.5
SMC066	6	0 50 55.39	-73 12 11	21	7.8	0.003-0.006	3	0	1	1	33.3	3	0	1		100.0	100.0
SMC067	5	0 50 55.54	-72 43 39.7	53	8.2	0.003-0.006	107	1	2	3	2.8	97	1	2		90.7	100.0
SMC068	6	0 50 56.26	-73 17 21.1	70	7.7	0.003-0.006	134	9	3	12	9.0	133	9	3		99.3	100.0
SMC068	8	0 50 56.26	-73 17 21.1	70	7.7	0.003-0.006	121	4	0	4	3.3	106	4	0		87.6	100.0
SMC069	5	0 51 14.13	-73 9 41.5	45	7.6	0.003-0.006	139	1	5	6	4.3	114	1	4		82.0	83.3
SMC069	6	0 51 14.13	-73 9 41.5	45	7.6	0.003-0.006	108	5	4	9	8.3	102	5	4		94.4	100.0
SMC069	8	0 51 14.13	-73 9 41.5	45	7.6	0.003-0.006	65	1	0	1	1.5	47	1	0		72.3	100.0
SMC070	6	0 51 26.15	-73 16 59.8	18	7.8	$\leq 0.003$	23	1	0	1	4.3	22	1	0		95.7	100.0
SMC070	8	0 51 26.15	-73 16 59.8	18	7.8	$\leq 0.003$	16	0	0	0	0.0	15	0	0		93.8	-

Table B.1. continued

Cluster	Image WFI	RA(2000)	DEC(2000)	r "	log(t)	Z	<sup>a</sup> N*	<sup>c</sup>	<sup>d</sup>	<sup>b</sup>	<sup>b/a</sup>	N <sub>tot</sub>	NELS	NELS?	comments	N*	ELS
								NELS	NELS?	c+d	%	ogle	ogle	ogle		ogle/wfi	ogle/wfi
SMC071	5	0 51 31.78	-73 0 38.3	40	7.5	0.003-0.006	96	2	1	3	3.1	79	2	1		82.3	100.0
SMC071	8	0 51 31.78	-73 0 38.3	40	7.5	0.003-0.006	24	1	0	1	4.2	5	0	0		20.8	0.0
SMC072	6	0 51 41.69	-73 13 46.8	35	7.6	≤0.003	58	4	2	6	10.3	57	4	2		98.3	100.0
SMC072	8	0 51 41.69	-73 13 46.8	35	7.6	≤0.003	44	1	2	3	6.8	41	1	2		93.2	100.0
SMC073	5	0 51 44.03	-72 50 25.1	53	8.2	≤0.003	162	1	1	2	1.2	138	1	1		85.2	100.0
SMC073	7	0 51 44.03	-72 50 25.1	53	8.2	≤0.003	97	0	0	0	0.0	39	0	0		40.2	-
SMC074	5	0 51 52.91	-72 57 13.9	53	8.1	≤0.003	155	1	1	2	1.3	130	1	1		83.9	100.0
SMC074	7	0 51 52.91	-72 57 13.9	53	8.1	≤0.003	85	2	0	2	2.4	79	2	0		92.9	100.0
SMC074	8	0 51 52.91	-72 57 13.9	53	8.1	≤0.003	90	1	0	1	1.1	37	0	0		41.1	0.0
SMC075	8	0 51 54.32	-73 5 52.9	19	8.4	≤0.003	18	0	0	0	0.0	10	0	0		55.6	-
SMC076	7	0 52 12.47	-72 31 51.2	36	7.4	≤0.003	19	1	0	1	5.3	5	1	0		26.3	100.0
SMC077	5	0 52 13.34	-73 0 12.2	23	7.9	≤0.003	21	0	0	0	0.0	19	0	0		90.5	-
SMC077	8	0 52 13.34	-73 0 12.2	23	7.9	≤0.003	19	0	0	0	0.0	6	0	0		31.6	-
SMC078	5	0 52 16.56	-73 1 4	45	7.9	≤0.003	33	0	0	0	0.0	29	0	0		87.9	-
SMC078	8	0 52 16.56	-73 1 4	45	7.9	≤0.003	52	1	0	1	1.9	23	0	0		44.2	0.0
SMC081	5	0 52 33.65	-72 40 53.6	39	7.4	≤0.003	55	0	0	0	0.0	16	0	0		29.1	-
SMC081	7	0 52 33.65	-72 40 53.6	39	7.4	≤0.003	55	0	1	1	1.8	23	0	0		41.8	0.0
SMC082	7	0 52 42.12	-72 55 31.6	45	7.8	≤0.003	35	0	1	1	2.9	30	0	1		85.7	100.0
SMC082	8	0 52 42.12	-72 55 31.6	45	7.8	≤0.003	54	1	1	2	3.7	20	0	0		37.0	0.0
SMC083	8	0 52 44.27	-72 58 47.8	36	7.8	≤0.003	40	2	0	2	5.0	15	0	0		37.5	0.0
SMC089	7	0 53 5.28	-72 37 27.8	143	7.3	≤0.003	478	11	9	20	4.2	106	2	2		22.2	20.0
SMC090	8	0 53 5.59	-73 22 49.4	47	8.5	≤0.003	100	1	1	2	2.0	98	1	1		98.0	100.0
SMC092	7	0 53 17.9	-72 45 59.5	42	7.4	≤0.003	48	0	1	1	2.1	18	0	0		37.5	0.0
SMC098	8	0 54 46.73	-73 13 24.5	45	8.0	≤0.003	36	1	3	4	11.1	36	1	3		100.0	100.0
SMC099	7	0 54 48.24	-72 27 57.8	45	7.6	≤0.003	64	2	3	5	7.8	54	2	3		84.4	100.0
SMC104	7	0 55 32.98	-72 49 58.1	46	8.6	≤0.003	129	2	0	2	1.6	120	2	0		93.0	100.0
SMC105	7	0 55 42.99	-72 52 48.4	55	8.0	≤0.003	66	3	2	5	7.6	61	3	2		92.4	100.0
SMC107	9	0 56 18.68	-72 27 50.4	115	7.5	≤0.003	404	36	7	43	10.6	242	33	7		59.9	93.0
SMC109	9	0 57 29.8	-72 15 51.9	24	7.7	≤0.003	32	2	4	6	18.8	28	2	3		87.5	83.3
SMC112	9	0 57 57.14	-72 26 42	29	7.5	≤0.003	16	0	0	0	0.0	8	0	0		50.0	-
SMC115	9	0 58 33.64	-72 16 51.6	15	7.3	≤0.003	10	0	1	1	10.0	5	0	1		50.0	100.0
SMC115	11	0 58 33.64	-72 16 51.6	15	7.3	≤0.003	13	0	1	1	7.7	9	0	1		69.2	100.0
SMC117	9	0 59 13.86	-72 36 29.3	45	8.3	≤0.003	46	1	4	5	10.9	40	1	4		87.0	100.0
SMC117	12	0 59 13.86	-72 36 29.3	45	8.3	≤0.003	56	1	0	1	1.8	45	1	0		80.4	100.0
SMC120	9	1 0 1.33	-72 22 8.7	27	7.7	≤0.003	34	3	5	8	23.5	31	2	3		91.2	62.5
SMC120	11	1 0 1.33	-72 22 8.7	27	7.7	≤0.003	33	4	1	5	15.2	14	4	0		42.4	80.0
SMC121	9	1 0 13.03	-72 27 43.8	30	7.9	≤0.003	22	2	1	3	13.6	15	2	1		68.2	100.0
SMC121	11	1 0 13.03	-72 27 43.8	30	7.9	≤0.003	23	4	1	5	21.7	19	4	1		82.6	100.0
SMC121	12	1 0 13.03	-72 27 43.8	30	7.9	≤0.003	24	4	0	4	16.7	19	4	0		79.2	100.0
SMC124	9	1 0 34.41	-72 21 55.8	34	7.6	≤0.003	44	4	4	8	18.2	41	4	4		93.2	100.0
SMC124	11	1 0 34.41	-72 21 55.8	34	7.6	≤0.003	35	1	3	4	11.4	12	1	1		34.3	50.0
SMC126	12	1 1 2.01	-72 45 5.2	50	8.0	≤0.003	37	2	1	3	8.1	34	1	1		91.9	66.7

Table B.1. continued

Cluster	Image	RA(2000)	DEC(2000)	r	log(t)	Z	<sup>a</sup> N*	c	d	b	b/a	Ntot	NELS	NELS?	comments	N*	ELS
	WFI			"				NELS	NELS?	c+d	%	ogle	ogle	ogle		ogle/wfi	ogle/wfi
SMC128	11	1 1 37.15	-72 24 24.7	45	7.1	0.003-0.006	33	2	1	3	9.1	9	1	0		27.3	33.3
SMC128	12	1 1 37.15	-72 24 24.7	45	7.1	0.003-0.006	23	0	0	0	0.0	21	0	0		91.3	-
SMC129	12	1 1 45.08	-72 33 51.8	36	7.3	0.003-0.006	38	0	2	2	5.3	35	0	2		92.1	100.0
SMC134	11	1 3 11.52	-72 16 21	35	7.8	0.003-0.006	41	9	3	12	29.3	39	9	2		95.1	91.7
SMC134	13	1 3 11.52	-72 16 21	35	7.8	0.003-0.006	26	1	2	3	11.5	21	1	2		80.8	100.0
SMC137	12	1 3 22.67	-72 39 5.6	45	7.6	0.003-0.006	48	6	3	9	18.8	37	4	2		77.1	66.7
SMC138	13	1 3 53.02	-72 6 10.5	23	7.4	0.003-0.006	21	1	0	1	4.8	17	1	0		81.0	100.0
SMC139	12	1 3 53.44	-72 49 34.2	25	7.5	0.003-0.006	78	10	3	13	16.7	67	8	2		85.9	76.9
SMC140	12	1 4 14.1	-72 38 49.1	31	7.2	0.003-0.006	26	2	1	3	11.5	22	1	1		84.6	66.7
SMC140	14	1 4 14.1	-72 38 49.1	31	7.2	0.003-0.006	18	0	0	0	0.0	4	0	0		22.2	-
SMC141	12	1 4 30.18	-72 37 9.4	43	8.2	0.003-0.006	46	2	0	2	4.3	42	2	0		91.3	100.0
SMC141	14	1 4 30.18	-72 37 9.4	43	8.2	0.003-0.006	7	0	0	0	0.0	2	0	0		28.6	-
SMC142	11	1 4 36.21	-72 9 38.5	51	7.3	0.003-0.006	108	4	1	5	4.6	91	1	1	2	84.3	40.0
SMC142	13	1 4 36.21	-72 9 38.5	51	7.3	0.003-0.006	26	0	1	1	3.8	7	0	0		26.9	0.0
SMC143	11	1 4 39.61	-72 32 59.7	34	8.2	0.003-0.006	15	0	0	0	0.0	3	0	0		20.0	-
SMC143	12	1 4 39.61	-72 32 59.7	34	8.2	0.003-0.006	28	1	0	1	3.6	26	1	0		92.9	100.0
SMC144	11	1 4 5.23	-72 7 14.6	23	7.6	0.003-0.006	15	2	0	2	13.3	12	2	0		80.0	100.0
SMC144	13	1 4 5.23	-72 7 14.6	23	7.6	0.003-0.006	12	0	0	0	0.0	2	0	0		16.7	-
SMC145	13	1 5 4.3	-71 59 24.8	23	7.9	0.003-0.006	9	1	0	1	11.1	4	1	0		44.4	100.0
SMC146	13	1 5 13.4	-71 59 41.8	18	7.3	0.003-0.006	7	0	0	0	0.0	5	0	0		71.4	-
SMC147	13	1 5 7.95	-71 59 45.1	27	7.1	0.003-0.006	13	0	1	1	7.7	11	0	1		84.6	100.0
SMC149	11	1 5 21.51	-72 2 34.7	45	8.2	0.003-0.006	162	3	1	4	2.5	20	1	0		12.3	25.0
SMC149	13	1 5 21.51	-72 2 34.7	45	8.2	0.003-0.006	144	1	1	2	1.4	112	1	1		77.8	100.0
SMC153	13	1 6 47.74	-72 16 24.5	34	7.2	0.003-0.006	37	2	1	3	8.1	12	0	0		32.4	0.0
SMC154	14	1 7 2.27	-72 37 18.2	41	8.2	0.003-0.006	14	0	0	0	0.0	2	0	0		14.3	-
SMC155	14	1 7 27.83	-72 29 35.5	51	7.7	0.003-0.006	41	3	0	3	7.3	38	3	0		92.7	100.0
SMC156	14	1 7 28.47	-72 46 9.5	51	8.2	0.003-0.006	51	0	2	2	3.9	48	0	2		94.1	100.0
SMC160	13	1 8 37.48	-72 26 20.9	25	7.6	0.003-0.006	16	0	1	1	6.3	7	0	0		43.8	0.0
SMC160	14	1 8 37.48	-72 26 20.9	25	7.6	0.003-0.006	7	0	1	1	14.3	4	0	0		57.1	0.0
SMC177	4	0 44 55.05	-73 10 27.4	11	7.9	0.003-0.006	14	0	0	0	0.0	13	0	0		92.9	-
SMC187	4	0 47 5.87	-73 22 16.6	17	8.2	0.003-0.006	12	1	0	1	8.3	12	1	0		100.0	100.0
SMC187	6	0 47 5.87	-73 22 16.6	18	8.2	0.003-0.006	9	1	0	1	11.1	9	1	0		100.0	100.0

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Table B.1. continued

Cluster	Image	RA(2000)	DEC(2000)	r	log(t)	Z	<sup>a</sup> N*	<sup>c</sup>	<sup>d</sup>	<sup>b</sup>	<sup>b/a</sup>	Ntot	NELS	NELS?	comments	N*	ELS
	WFI			"				NELS	NELS?	c+d	%	ogle	ogle	ogle		ogle/wfi	ogle/wfi
SMC194	6	0 49 5.58	-73 21 9.8	19	7.9	0.003-0.006	14	0	1	1	7.1	10	0	1		71.4	100.0
SMC195	6	0 49 16.45	-73 14 56.8	15	7.3	0.003-0.006	17	0	0	0	0.0	12	0	0		70.6	-
SMC198	5	0 50 7.51	-73 11 25.9	30	7.9	0.003-0.006	51	0	2	2	3.9	49	0	2		96.1	100.0
SMC198	6	0 50 7.51	-73 11 25.9	30	7.9	0.003-0.006	45	3	1	4	8.9	45	3	1		100.0	100.0
SMC200	5	0 50 38.98	-72 58 43.6	9	8.0	0.003-0.006	10	0	0	0	0.0	10	0	0		100.0	-
SMC210	8	0 52 30.3	-73 2 59	15	8.2	$\leq 0.003$	10	0	0	0	0.0	2	0	0		20.0	-
SMC230	11	1 0 33.15	-72 15 30.5	9	7.5	$\leq 0.003$	5	0	0	0	0.0	1	0	0		20.0	-

<sup>1</sup>: SMC17 & SMC18 have common stars since it appears to be a binary-cluster.

<sup>2</sup>: The extracted spectrum of the candidate emission-line star is a blend of 2 emission-line stars spectra.

a:N\*: This column correspond to the total number of stars/spectra extracted.

c:NELS: This column gives the number of definite emission-line stars found.

d:NELS?: this column gives the number of candidate emission-line stars found.

b:c+d: This column gives the total number of (definite+candidate) emission line stars.

b/a %: This column gives the proportion in % of emission-line stars to the whole sample by open cluster.

**Table B.2.** Details about the individual open clusters with different observations merged. The redundant stars are removed. Note that, here only the WFI stars found in Ogle catalogues (Udalski et al. 1998) are taken into account. In cols. 2, 3, 4, 5, the number of normal stars, emission-line star, candidate emission-line star, sum of emission-line star are given. In col. 6, the ratio of emission-line star to all stars (normal+all emission-line star) is given. The next columns give the same indications than before but for classified stars (Be, B, Oe, O, etc). The last column gives the number of emission-line stars, which are in the Main Sequence but that are not O or B or A-type stars.

Cluster	Nabs ogle	NELS ogle	NELS? ogle	NELS no ogle	$\frac{ELS}{all*}$ %	Be	Be?	B	$\frac{Be}{allB}$ %	$\frac{Be+Be?}{allB}$ %	Oe	O	$\frac{Oe}{allO}$	Ae	A	$\frac{Ae}{allA}$	OeBeAe	OBA	$\frac{OeBeAe}{allOBA}$	ELS main sequence not OBA
SMC002	25	0	1	0	3.8	0	1	3	0.00	25.00					3	0.00	1	6	14.29	
SMC008	110	4	2	0	5.2	1	1	55	1.75	3.51		1	0.00		9	0.00	2	65	2.99	4
SMC009	60	1	2	0	4.8	1	2	34	2.70	8.11					2	0.00	3	36	7.69	
SMC011	64	3	3	0	8.6	3	2	22	11.11	18.52		1	0.00	1	4	20.00	6	27	18.18	
SMC012	65	0	0	2	3.0	0		3	0.00	0.00					2	0.00	0	5	0.00	
SMC015	94	3	2	0	5.1	1	1	25	3.70	7.41					15	0.00	2	40	4.76	3
SMC016	111	0	1	0	0.9	0	1	22	0.00	4.35		1	0.00		11	0.00	1	34	2.86	
SMC017	62	1	0	0	1.6	0		23	0.00	0.00	1	1	50.00		6	0.00	1	30	3.23	
SMC018	55	1	0	0	1.8	1		21	4.55	4.55		2	0.00				1	23	4.17	1
SMC019	7	0	0	0	0.0					-							0	0		2
SMC020	7	0	0	0	0.0					-					1	0.00	0	1	0.00	
SMC025	29	0	0	0	0.0			15	0.00	0.00							0	15	0.00	
SMC032	39	0	0	0	0.0			11	0.00	0.00					1	0.00	0	12	0.00	
SMC033	8	0	1	0	11.1			6	0.00	0.00	1		100.00				1	6	14.29	
SMC038	64	0	0	0	0.0			17	0.00	0.00					4	0.00	0	21	0.00	
SMC039	182	4	7	0	5.7	1	4	46	1.96	9.80				2	15	11.76	7	61	10.29	4
SMC043	53	1	1	0	3.6		1	16	0.00	5.88					6	0.00	1	22	4.35	1
SMC047	17	0	2	1	15.0		1	3	0.00	25.00							1	3	25.00	1
SMC049	55	2	4	1	11.3	1	1	17	5.26	10.53				1	5	16.67	3	22	12.00	3
SMC054	38	3	2	0	11.6	2	1	17	10.00	15.00		1	0.00		4	0.00	3	22	12.00	2
SMC059	25	0	0	0	0.0			9	0.00	0.00							0	9	0.00	
SMC061	37	1	4	0	11.9		2	19	0.00	9.52					2	0.00	2	21	8.70	3
SMC064	105	3	4	1	7.1	2	4	45	3.92	11.76		1	0.00				6	46	11.54	1
SMC066	2	0	1	0	33.3		1		0.00	100.00		1	0.00				1	1		
SMC067	94	1	2	0	3.1	1		34	2.86	2.86					1	0.00	1	35	2.78	2
SMC068	142	11	3	0	9.0	8	1	55	12.50	14.06		1	0.00		4	0.00	9	60	13.04	5
SMC069	164	5	7	0	6.8	4	5	55	6.25	14.06		2	0.00		13	0.00	9	70	11.39	3
SMC070	24	1	0	0	4.0			9	0.00	0.00					1	0.00	0	10	0.00	1
SMC071	81	2	1	0	3.6	1		24	4.00	4.00	1	1	50.00				2	25	7.41	1
SMC072	60	4	2	0	9.1	3	1	15	15.79	21.05					4	0.00	4	19	17.39	2
SMC073	161	1	1	0	1.2	1		60	1.64	1.64					10	0.00	1	70	1.41	1
SMC074	183	1	2	0	1.6	1		34	2.86	2.86		1	0.00		17	0.00	1	52	1.89	2
SMC075	10	0	0	0	0.0			5	0.00	0.00					2	0.00	0	7	0.00	
SMC076	4	1	0	0	20.0			1	0.00	0.00							0	1	0.00	1
SMC077	24	0	0	0	0.0			8	0.00	0.00					1	0.00	0	9	0.00	
SMC078	52	0	0	1	1.9			17	0.00	0.00					7	0.00	0	24	0.00	
SMC081	38	0	0	1	2.6			4	0.00	0.00					7	0.00	0	11	0.00	
SMC082	45	0	2	1	6.3			9	0.00	0.00					4	0.00	0	13	0.00	2

**Table B.2.** Individual clusters, continued

Cluster	Nabs	NELS	NELS?	NELS	$\frac{ELS}{all*}$	Be	Be?	B	$\frac{Be}{allB}$	$\frac{Be+Be?}{allB}$	Oe	O	$\frac{Oe}{allO}$	Ae	A	$\frac{Ae}{allA}$	OeBeAe	OBA	$\frac{OeBeAe}{allOBA}$	ELS main sequence not OBA
	ogle	ogle	ogle	no ogle	%				%	%										
SMC083	15	0	0	2	11.8			3	0.00	0.00					4	0.00	0	7	0.00	
SMC089	102	2	2	16	16.4	1		16	5.88	5.88				1	6	14.29	2	22	8.33	2
SMC090	96	1	1	0	2.0			9	0.00	0.00					1	0.00	0	10	0.00	2
SMC092	18	0	0	1	5.3			7	0.00	0.00					1	0.00	0	8	0.00	
SMC098	32	1	3	0	11.1			6	0.00	0.00					2	0.00	0	8	0.00	4
SMC099	49	2	3	0	9.3	1	1	25	3.70	7.41					1	0.00	2	26	7.14	3
SMC104	118	2	0	0	1.7	1		15	6.25	6.25					6	0.00	1	21	4.55	1
SMC105	56	3	2	0	8.2	1		7	12.50	12.50	1	1	50.00		2	0.00	2	10	16.67	3
SMC107	202	33	7	3	17.6	25	6	92	20.33	25.20	1		100.00		16	0.00	32	108	22.86	8
SMC109	23	2	3	0	17.9	1	1	6	12.50	25.00							2	6	25.00	3
SMC112	8	0	0	0	0.0			4	0.00	0.00					1	0.00	0	5	0.00	
SMC115	11	0	1	0	8.3		1	3	0.00	25.00					1	0.00	1	4	20.00	
SMC117	60	2	4	0	9.1	2		16	11.11	11.11					4	0.00	2	20	9.09	4
SMC120	30	3	3	0	16.7	3	2	12	17.65	29.41					2	0.00	5	14	26.32	1
SMC121	23	5	2	0	23.3	3	1	9	23.08	30.77					4	0.00	4	13	23.53	3
SMC124	36	4	5	0	20.0	4	3	17	16.67	29.17		2	0.00		1	0.00	7	20	25.93	2
SMC126	32	1	1	1	8.6	1	1	11	7.69	15.38		1	0.00		1	0.00	2	13	13.33	
SMC128	27	1	0	2	10.0	1		13	7.14	7.14							1	13	7.14	
SMC129	33	0	2	0	5.7			17	0.00	0.00		2	0.00				0	19	0.00	2
SMC134	30	9	2	1	28.6	9	2	19	30.00	36.67					2	0.00	11	21	34.38	
SMC137	31	4	2	3	22.5	4	2	20	15.38	23.08							6	20	23.08	
SMC138	16	1	0	0	5.9	1		11	8.33	8.33							1	11	8.33	
SMC139	57	8	2	3	18.6	8		31	20.51	20.51		1	0.00				8	32	20.00	2
SMC140	22	1	1	1	12.0	1	1	11	7.69	15.38		1	0.00				2	12	14.29	
SMC141	42	2	0	0	4.5			18	0.00	0.00				1		100.00	1	18	5.26	1
SMC142	90	1	1	3	5.3	1		58	1.69	1.69		1	0.00		3	0.00	1	62	1.59	1
SMC143	28	1	0	0	3.4	1		13	7.14	7.14					2	0.00	1	15	6.25	
SMC144	10	2	0	0	16.7	2		8	20.00	20.00							2	8	20.00	
SMC145	3	1	0	0	25.0			3	0.00	0.00							0	3	0.00	1
SMC146	5	0	0	0	0.0			4	0.00	0.00							0	4	0.00	
SMC147	10	0	1	0	9.1		1	8	0.00	11.11							1	8	11.11	
SMC149	127	2	1	0	2.3			48	0.00	0.00				1	15	6.25	1	63	1.56	2
SMC153	12	0	0	3	20.0			3	0.00	0.00					2	0.00	0	5	0.00	
SMC154	2	0	0	0	0.0					-							0	0		
SMC155	35	3	0	0	7.9	3		19	13.64	13.64							3	19	13.64	
SMC156	46	0	2	0	4.2			13	0.00	0.00		1	0.00				0	14	0.00	2

**Table B.2.** Individual clusters, continued

Cluster	Nabs	NELS	NELS?	NELS	$\frac{ELS}{all*}$	Be	Be?	B	$\frac{Be}{allB}$	$\frac{Be+Be?}{allB}$	Oe	O	$\frac{Oe}{allO}$	Ae	A	$\frac{Ae}{allA}$	OeBeAe	OBA	$\frac{OeBeAe}{allOBA}$	ELS main sequence not OBA
	ogle	ogle	ogle	no ogle	%				%	%										
SMC160	11	0	0	2	15.4			6	0.00	0.00							0	6	0.00	
SMC177	13	0	0	0	0.0			5	0.00	0.00					1	0.00	0	6	0.00	
SMC187	13	1	0	0	7.1			3	0.00	0.00	1		100.00				1	3	25.00	2
SMC194	9	0	1	0	10.0			5	0.00	0.00					1	0.00	0	6	0.00	1
SMC195	12	0	0	0	0.0			4	0.00	0.00					2	0.00	0	6	0.00	
SMC198	64	3	2	0	7.2	3	2	23	10.71	17.86		1	0.00		3	0.00	5	27	15.63	
SMC200	10	0	0	0	0.0			2	0.00	0.00							0	2	0.00	
SMC210	2	0	0	0	0.0			1	0.00	0.00							0	1	0.00	
SMC230	1	0	0	0	0.0			1	0.00	0.00							0	1	0.00	

**Appendix C: Tables of Oe/Be/Ae stars, and other emission-line star**

The following tables include information (astrometry, apparent and dereddened photometry, classification, etc.) for each emission-line star found.

**Table C.1.** Table 1 of Be stars: cross-correlation WFI with Ogle (Udalski et al. 1998, cols. 3, 5, 8, 9): astrometry, apparent photometry. The last column 'Mult' indicates whether the star is found several times as emission-line star in case of different observations in WFI (different images). '1' means that the star was observed once (or the spectrum extracted once).

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC8	2	sc2	34940	35350	0.7	0 40 36.853	-73 23 42.137	0 40 36.950	-73 23 41.900	16.978	16.857	16.911	-0.120	0.067	0.070	8	2
SMC9	2	sc2	35267	35310	0.7	0 40 48.606	-73 23 39.151	0 40 48.700	-73 23 38.900	16.420	16.360	16.226	-0.060	0.194	0.070	8	1
SMC11	2	sc2	39854	61751	0.7	0 41 6.708	-73 21 10.595	0 41 6.770	-73 21 10.300	16.566	16.529	16.464	-0.037	0.102	0.080	7.9	1
SMC11	2	sc2	40737	64032	0.7	0 41 8.835	-73 20 43.105	0 41 8.910	-73 20 42.800	17.113	17.053	17.046	-0.060	0.067	0.080	7.9	2
SMC11	2	sc2	40443	64100	0.8	0 40 57.870	-73 20 45.337	0 40 57.960	-73 20 45.000	17.436	17.385	17.387	-0.051	0.049	0.080	7.9	1
SMC15	1	sc3	8873	19972	1.0	0 42 54.158	-73 17 47.769	0 42 54.110	-73 17 47.200	16.104	16.222	15.864	0.118	0.240	0.100	8.1	2
SMC18	2	sc3	33376	63443	1.2	0 43 43.301	-73 26 37.750	0 43 43.280	-73 26 36.900	16.372	16.325	16.211	-0.047	0.161	0.100	7.9	1
SMC39	4	sc4	17655	101253	0.9	0 47 23.027	-73 28 54.319	0 47 23.200	-73 28 54.200	16.426	16.345	16.387	-0.080	0.038	0.110	8	2
SMC49	6	sc5	18899	11574	1.3	0 48 33.723	-73 25 18.021	0 48 33.930	-73 25 17.600	17.238	17.053	17.373	-0.184	-0.135	0.060	7	1
SMC54	6	sc5	26334	95248	1.0	0 49 12.561	-73 21 56.704	0 49 12.710	-73 21 56.500	15.794	15.783	15.619	-0.012	0.175	0.100	8	1
SMC54	6	sc5	26058	95331	1.1	0 49 23.815	-73 22 12.458	0 49 24.000	-73 22 12.400	17.526	17.665	17.333	0.138	0.193	0.100	8	1
SMC64	5	sc5	30728	208058	0.8	0 50 36.928	-72 58 17.085	0 50 36.880	-72 58 17.300	16.510	16.445	16.362	-0.064	0.148	0.100	8.1	1
SMC64	5	sc5	30064	208208	0.6	0 50 36.668	-72 58 37.235	0 50 36.640	-72 58 37.400	17.217	17.316	17.022	0.099	0.194	0.100	8.1	1
SMC67	5	sc5	57461	235272	0.7	0 50 44.547	-72 43 22.924	0 50 44.520	-72 43 23.000	17.515	17.479	17.469	-0.036	0.046	0.080	8.2	1
SMC68	6	sc5	35590	180008	0.7	0 50 47.928	-73 18 17.873	0 50 47.990	-73 18 17.600	15.303	15.353	15.087	0.049	0.216	0.090	7.7	1
SMC68	6	sc5	35764	180009	0.7	0 50 47.697	-73 18 12.931	0 50 47.760	-73 18 12.600	15.769	15.787	15.527	0.018	0.242	0.090	7.7	1
SMC68	6	sc5	38010	260813	0.6	0 50 59.652	-73 17 20.172	0 50 59.670	-73 17 19.900	15.169	15.188	14.860	0.019	0.309	0.090	7.7	2
SMC68	6	sc5	36917	260959	0.8	0 50 51.930	-73 17 42.433	0 50 52.010	-73 17 42.100	16.485	16.345	16.569	-0.139	-0.084	0.090	7.7	1
SMC68	6	sc5	37293	260859	0.6	0 51 3.689	-73 17 40.805	0 51 3.690	-73 17 40.500	16.522	16.500	16.286	-0.023	0.236	0.090	7.7	2
SMC68	8	sc5	14944	180226	0.6	0 50 43.369	-73 16 47.113	0 50 43.420	-73 16 46.900	16.513	16.420	16.463	-0.094	0.051	0.090	7.7	1
SMC68	6	sc5	38765	260985	0.7	0 50 59.102	-73 17 0.754	0 50 59.160	-73 17 0.400	16.895	16.819	16.821	-0.076	0.074	0.090	7.7	1
SMC68	6	sc5	39644	260998	0.6	0 50 58.294	-73 16 36.576	0 50 58.310	-73 16 36.300	17.386	17.312	17.288	-0.074	0.098	0.090	7.7	1
SMC69	5	sc5	7935	271170	1.1	0 51 20.675	-73 9 18.808	0 51 20.580	-73 9 19.200	15.987	15.957	15.761	-0.030	0.226	0.080	7.6	2
SMC69	5	sc5	6201	271315	1.1	0 51 7.163	-73 9 56.045	0 51 7.060	-73 9 56.400	17.032	17.035	16.919	0.003	0.112	0.080	7.6	1
SMC69	5	sc5	5670	271299	1.2	0 51 12.127	-73 10 15.705	0 51 12.020	-73 10 16.000	17.324	17.251	17.283	-0.073	0.041	0.080	7.6	1
SMC69	5	sc5	6818	271325	0.4	0 51 12.511	-73 9 43.791	0 51 12.490	-73 9 44.000	16.937	16.877	16.870	-0.060	0.068	0.080	7.6	1
SMC71	5	sc5	27502	289148	0.9	0 51 26.709	-73 0 23.158	0 51 26.650	-73 0 23.400	17.811	17.705	17.646	-0.107	0.166	0.070	7.5	1
SMC72	6	sc6	46694	17275	0.7	0 51 43.176	-73 13 52.670	0 51 43.190	-73 13 52.300	14.856	14.817	14.769	-0.040	0.088	0.080	7.6	2
SMC72	6	sc6	46921	17305	0.9	0 51 44.584	-73 13 45.327	0 51 44.540	-73 13 44.900	15.620	15.552	15.470	-0.068	0.149	0.080	7.6	2
SMC72	6	sc6	47659	17307	1.0	0 51 43.688	-73 13 40.586	0 51 43.640	-73 13 40.100	15.617	15.373	15.689	-0.244	-0.072	0.080	7.6	1
SMC73	5	sc6	46610	61571	0.3	0 51 40.553	-72 50 9.130	0 51 40.560	-72 50 9.200	17.363	17.301	17.271	-0.064	0.093	0.110	8.2	1
SMC74	5	sc6	35145	49150	0.7	0 51 55.844	-72 56 57.122	0 51 55.800	-72 56 57.500	15.703	15.672	15.430	-0.030	0.272	0.090	8.1	3
SMC89	7	sc6	40369	242010	1.5	0 53 2.839	-72 38 49.031	0 53 2.950	-72 38 48.600	16.412	16.261	16.437	-0.150	-0.025	0.090	7.3	1
SMC99	7	sc7	58735	70868	1.4	0 54 40.620	-72 27 52.424	0 54 40.730	-72 27 52.300	16.012	15.972	15.897	-0.040	0.115	0.080	7.6	1
SMC104	7	sc7	22294	110315	0.8	0 55 33.234	-72 50 13.211	0 55 33.290	-72 50 12.900	17.521	17.579	17.424	0.058	0.096	0.120	8.6	1
SMC105	7	sc7	16723	110195	0.6	0 55 44.220	-72 53 4.162	0 55 44.260	-72 53 3.900	17.206	17.167	17.155	-0.039	0.051	0.110	8	1

Table C.1. Be stars table1, continued

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC107	9	sc7	36804	205918	1.4	0 56 14.797	-72 28 47.857	0 56 14.900	-72 28 47.400	15.350	15.296	15.221	-0.054	0.129	0.100	7.5	1
SMC107	9	sc7	37317	205923	1.6	0 56 17.606	-72 28 32.697	0 56 17.720	-72 28 32.200	15.682	15.635	15.551	-0.047	0.131	0.100	7.5	1
SMC107	9	sc7	38203	205925	1.3	0 56 26.511	-72 28 9.711	0 56 26.600	-72 28 9.200	15.702	15.652	15.561	-0.050	0.140	0.100	7.5	1
SMC107	9	sc7	38679	205930	1.6	0 56 31.034	-72 27 58.173	0 56 31.150	-72 27 57.700	15.527	15.484	15.407	-0.043	0.120	0.100	7.5	1
SMC107	9	sc7	38683	205931	1.1	0 56 22.946	-72 27 54.233	0 56 23.020	-72 27 53.800	15.263	15.175	15.189	-0.088	0.074	0.100	7.5	1
SMC107	9	sc7	38865	206011	0.9	0 56 13.394	-72 27 44.887	0 56 13.370	-72 27 44.500	15.808	15.707	15.731	-0.101	0.076	0.100	7.5	1
SMC107	9	sc7	38965	205936	1.9	0 56 32.132	-72 27 50.396	0 56 32.270	-72 27 50.000	15.506	15.546	15.248	0.039	0.258	0.100	7.5	1
SMC107	9	sc7	39104	205944	1.8	0 56 19.734	-72 27 36.169	0 56 19.870	-72 27 35.800	15.351	15.227	15.357	-0.123	-0.006	0.100	7.5	1
SMC107	9	sc7	39541	205946	1.8	0 56 11.996	-72 27 17.149	0 56 12.130	-72 27 16.800	15.276	15.188	15.254	-0.088	0.022	0.100	7.5	1
SMC107	9	sc7	40094	205949	1.6	0 56 25.333	-72 27 7.245	0 56 25.450	-72 27 6.800	15.398	15.329	15.336	-0.069	0.062	0.100	7.5	1
SMC107	9	sc7	36907	205968	1.4	0 56 11.550	-72 28 42.186	0 56 11.650	-72 28 41.700	16.260	16.190	16.200	-0.071	0.060	0.100	7.5	1
SMC107	9	sc7	37301	205974	1.3	0 56 14.154	-72 28 30.447	0 56 14.250	-72 28 30.000	15.918	15.872	15.785	-0.046	0.132	0.100	7.5	1
SMC107	9	sc7	38467	205987	0.4	0 56 20.634	-72 28 1.428	0 56 20.670	-72 28 2.100	16.058	15.823	16.260	-0.235	-0.201	0.100	7.5	1
SMC107	9	sc7	39179	206025	1.2	0 56 23.056	-72 27 35.996	0 56 23.140	-72 27 35.600	16.515	16.447	16.577	-0.068	-0.061	0.100	7.5	1
SMC107	9	sc7	39366	206032	0.8	0 56 20.226	-72 27 29.089	0 56 20.260	-72 27 28.600	16.049	16.032	15.984	-0.016	0.064	0.100	7.5	1
SMC107	9	sc7	39478	206034	1.3	0 56 18.896	-72 27 23.423	0 56 18.990	-72 27 23.000	16.565	16.521	16.453	-0.044	0.111	0.100	7.5	1
SMC107	9	sc7	40319	206040	1.9	0 56 32.982	-72 27 5.178	0 56 33.120	-72 27 4.800	16.025	15.966	15.987	-0.059	0.038	0.100	7.5	1
SMC107	9	sc7	41361	206053	2.0	0 56 26.461	-72 26 23.197	0 56 26.610	-72 26 22.900	16.167	16.059	16.266	-0.107	-0.099	0.100	7.5	1
SMC107	9	sc7	37894	205982	1.5	0 56 22.302	-72 28 15.990	0 56 22.410	-72 28 15.500	16.646	16.609	16.534	-0.037	0.112	0.100	7.5	1
SMC107	9	sc7	38300	206133	1.6	0 56 10.183	-72 27 53.434	0 56 10.300	-72 27 53.100	17.375	17.347	17.377	-0.028	-0.002	0.100	7.5	1
SMC107	9	sc7	38540	206160	1.6	0 56 7.383	-72 27 44.010	0 56 7.500	-72 27 43.600	16.747	16.711	16.591	-0.036	0.156	0.100	7.5	1
SMC107	9	sc7	39354	206185	1.3	0 56 17.086	-72 27 29.979	0 56 17.190	-72 27 30.700	17.267	17.161	17.339	-0.106	-0.072	0.100	7.5	1
SMC107	9	sc7	39384	206188	0.7	0 56 21.403	-72 27 28.062	0 56 21.400	-72 27 27.700	17.157	17.047	17.037	-0.110	0.119	0.100	7.5	1
SMC107	9	sc7	41254	206236	1.5	0 56 24.517	-72 26 24.960	0 56 24.630	-72 26 24.600	16.874	16.837	16.761	-0.038	0.113	0.100	7.5	1
SMC107	9	sc7	38559	206145	0.8	0 56 10.304	-72 27 48.981	0 56 10.330	-72 27 48.500	17.537	17.449	17.481	-0.088	0.056	0.100	7.5	1
SMC109	9	sc7?	61137	53213	1.6	0 57 31.767	-72 15 37.342	0 57 31.870	-72 15 37.100	17.688	17.581	17.574	-0.107	0.114	0.040	7.7	1
SMC117	9	sc8	28212	142833	1.9	0 59 17.075	-72 35 51.333	0 59 17.210	-72 35 51.100	17.412	17.293	17.460	-0.119	-0.048	0.130	8.3	1
SMC117	12	sc8	36065	139543	0.7	0 59 25.758	-72 36 24.578	0 59 25.760	-72 36 24.200	17.417	17.325	17.271	-0.092	0.145	0.130	8.3	1
SMC120	9	sc8	52820	201621	0.7	0 59 58.720	-72 22 2.376	0 59 58.760	-72 22 2.100	16.845	16.791	16.752	-0.054	0.091	0.070	7.7	2
SMC120	9	sc8	52849	201539	0.9	1 0 4.226	-72 22 5.509	1 0 4.280	-72 22 5.200	16.528	16.484	16.421	-0.044	0.107	0.070	7.7	2
SMC120	11	sc8	11026	201772	1.2	1 0 2.364	-72 22 40.243	1 0 2.440	-72 22 39.700	17.750	17.681	17.661	-0.069	0.089	0.070	7.7	1
SMC121	11	sc8	2977	198549	0.9	1 0 7.836	-72 28 4.451	1 0 7.880	-72 28 3.900	15.135	15.074	14.963	-0.062	0.172	0.080	7.9	2
SMC121	11	sc8	3894	198574	1.1	1 0 19.505	-72 27 36.775	1 0 19.570	-72 27 36.200	16.361	16.311	16.296	-0.050	0.064	0.080	7.9	2
SMC121	11	sc8	3329	198617	1.0	1 0 11.706	-72 27 53.716	1 0 11.760	-72 27 53.200	16.964	16.859	16.929	-0.105	0.035	0.080	7.9	2
SMC124	9	sc8	53638	33009	0.9	1 0 33.639	-72 21 57.151	1 0 33.690	-72 21 56.600	16.332	16.245	16.303	-0.086	0.028	0.060	7.6	1
SMC124	9	sc8	53423	33008	0.5	1 0 33.359	-72 22 3.541	1 0 33.380	-72 22 3.100	16.715	16.701	16.653	-0.013	0.062	0.060	7.6	1
SMC124	9	sc8	53877	36040	0.4	1 0 35.118	-72 21 50.073	1 0 35.120	-72 21 49.700	16.985	16.827	16.964	-0.157	0.021	0.060	7.6	1
SMC124	9	sc8	54376	36013	0.5	1 0 30.158	-72 21 30.018	1 0 30.170	-72 21 29.600	16.674	16.652	16.526	-0.023	0.149	0.060	7.6	2

**Table C.1.** Be stars table1, continued

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC126	12	sc9	22724	13435	0.8	1 0 55.826	-72 44 50.848	1 0 55.890	-72 44 50.600	16.887	16.806	16.904	-0.082	-0.017	0.070	8	1
SMC128	11	sc9	10309	78904	1.3	1 1 36.265	-72 24 17.857	1 1 36.360	-72 24 17.500	17.361	17.256	17.485	-0.105	-0.124	0.090	7.1	1
SMC134	11	sc9	23627	168332	0.6	1 3 9.526	-72 16 22.771	1 3 9.570	-72 16 22.600	14.997	14.976	14.981	-0.022	0.016	0.050	7.8	2
SMC134	11	sc9	23610	168408	0.5	1 3 11.782	-72 16 24.363	1 3 11.790	-72 16 24.200	16.924	16.839	16.853	-0.086	0.071	0.050	7.8	2
SMC134	11	sc9	23713	168413	0.8	1 3 11.483	-72 16 20.708	1 3 11.460	-72 16 20.500	17.162	17.149	17.091	-0.013	0.071	0.050	7.8	1
SMC134	11	sc9	23901	168419	0.5	1 3 11.254	-72 16 18.228	1 3 11.260	-72 16 18.100	17.244	17.202	17.154	-0.042	0.088	0.050	7.8	1
SMC134	11	sc9	23926	168536	0.6	1 3 11.709	-72 16 13.310	1 3 11.760	-72 16 13.200	17.299	17.246	17.223	-0.054	0.076	0.050	7.8	2
SMC134	11	sc9	24123	168424	0.5	1 3 11.339	-72 16 5.568	1 3 11.370	-72 16 5.400	16.860	16.925	16.769	0.064	0.091	0.050	7.8	1
SMC134	11	sc9	23667	168523	0.9	1 3 13.064	-72 16 23.072	1 3 13.040	-72 16 22.800	17.633	17.599	17.536	-0.034	0.098	0.050	7.8	1
SMC134	11	sc9	23886	168420	0.6	1 3 13.634	-72 16 16.436	1 3 13.630	-72 16 16.200	17.310	17.102	17.191	-0.208	0.118	0.050	7.8	1
SMC134	11	sc9	23344	168515	0.5	1 3 9.484	-72 16 32.749	1 3 9.500	-72 16 32.600	17.758	17.625	17.717	-0.133	0.042	0.050	7.8	1
SMC137	12	sc9	36860	152653	0.5	1 3 24.801	-72 38 55.451	1 3 24.800	-72 38 55.300	16.191	16.118	16.070	-0.072	0.121	0.060	7.6	1
SMC137	12	sc9	37291	152708	0.5	1 3 21.729	-72 38 39.068	1 3 21.740	-72 38 38.900	17.012	16.928	16.987	-0.084	0.025	0.060	7.6	1
SMC137	12	sc9	36179	152694	0.6	1 3 14.967	-72 39 11.515	1 3 14.960	-72 39 11.300	17.340	17.264	17.244	-0.076	0.096	0.060	7.6	1
SMC137	12	sc9	36574	152806	1.0	1 3 24.745	-72 39 4.998	1 3 24.700	-72 39 4.800	17.635	17.593	17.621	-0.042	0.013	0.060	7.6	1
SMC138	13	sc10	26557	33961	0.9	1 3 53.991	-72 6 8.706	1 3 54.060	-72 6 8.500	15.890	15.867	15.734	-0.023	0.155	0.040	7.4	1
SMC139	12	sc10	17338	31	1.2	1 3 53.109	-72 49 39.577	1 3 53.050	-72 49 39.200	15.092	14.981	15.053	-0.111	0.039	0.070	7.5	1
SMC139	12	sc10	17471	71	0.9	1 3 51.050	-72 49 34.960	1 3 51.020	-72 49 34.600	15.709	15.703	15.561	-0.006	0.148	0.070	7.5	1
SMC139	12	sc10	17654	33	0.7	1 3 53.103	-72 49 30.365	1 3 53.130	-72 49 30.000	15.268	15.317	15.327	0.049	-0.060	0.070	7.5	1
SMC139	12	sc10	17893	3038	0.9	1 3 56.776	-72 49 26.526	1 3 56.740	-72 49 26.200	15.366	15.238	15.320	-0.128	0.045	0.070	7.5	1
SMC139	12	sc10	17719	73	1.2	1 3 56.137	-72 49 32.603	1 3 56.070	-72 49 32.300	16.186	15.940	16.283	-0.247	-0.097	0.070	7.5	1
SMC139	12	sc10	17952	3065	1.0	1 3 53.184	-72 49 22.705	1 3 53.270	-72 49 22.400	16.036	15.926	15.960	-0.110	0.076	0.070	7.5	1
SMC139	12	sc10	17092	123	1.4	1 3 55.037	-72 49 49.265	1 3 54.960	-72 49 48.800	16.765	16.618	16.742	-0.148	0.023	0.070	7.5	1
SMC139	12	sc10	17132	125	1.2	1 3 51.115	-72 49 44.440	1 3 51.060	-72 49 44.000	16.795	16.690	16.671	-0.105	0.123	0.070	7.5	1
SMC140	12	sc10	38008	52236	1.3	1 4 13.305	-72 38 49.732	1 4 13.240	-72 38 49.400	17.034	16.965	16.999	-0.069	0.035	0.090	7.2	1
SMC142	11	sc10	34166	70458	1.5	1 4 36.329	-72 9 41.518	1 4 36.260	-72 9 41.200	15.766	15.632	15.756	-0.134	0.011	0.060	7.3	1
SMC143	12	sc10	48420	54983	1.1	1 4 44.687	-72 33 23.019	1 4 44.640	-72 33 22.800	17.550	17.375	17.662	-0.174	-0.112	0.090	8.2	1
SMC144	11	sc10	37686	34152	0.7	1 4 2.606	-72 6 58.708	1 4 2.580	-72 6 58.700	17.844	17.745	17.976	-0.099	-0.132	0.050	7.6	1
SMC144	11	sc10	37554	71041	0.6	1 4 6.146	-72 7 8.434	1 4 6.130	-72 7 8.400	18.433	18.312	18.494	-0.120	-0.062	0.050	7.6	1
SMC155	14	sc11	29777	50950	0.3	1 7 30.789	-72 30 7.614	1 7 30.800	-72 30 7.600	15.807	15.726	15.642	-0.081	0.165	0.090	7.7	1
SMC155	14	sc11	30041	50952	0.3	1 7 31.021	-72 29 55.249	1 7 31.050	-72 29 55.300	15.598	15.510	15.514	-0.088	0.084	0.090	7.7	1
SMC155	14	sc11	29773	50977	0.5	1 7 27.808	-72 30 5.242	1 7 27.860	-72 30 5.300	16.203	16.064	16.201	-0.139	0.002	0.090	7.7	1
SMC198	6	sc5	49187	190611	1.1	0 50 5.525	-73 11 36.586	0 50 5.660	-73 11 36.500	17.203	17.175	17.015	-0.028	0.187	0.060	7.9	2
SMC198	6	sc5	50118	190637	0.7	0 50 9.830	-73 11 9.199	0 50 9.910	-73 11 9.100	17.589	17.574	17.442	-0.016	0.147	0.060	7.9	1
SMC198	6	sc5	50141	190640	0.7	0 50 8.177	-73 11 7.617	0 50 8.260	-73 11 7.500	17.755	17.708	17.539	-0.047	0.216	0.060	7.9	1



**Table C.2.** Table 2 of Be stars: corrected photometry and classification using calibration from Lang (1992). If a “?” appears in the col. ID Simbad it indicates a poor degree of confidence on the identification in Simbad

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	Mv	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC8	2	34940	-0.190	16.761	-1.989	-0.034	B2		
SMC9	2	35267	-0.130	16.203	-2.547	0.093	B2	[MA93] 20	Em*
SMC11	2	39854	-0.117	16.318	-2.432	-0.013	B2		
SMC11	2	40737	-0.140	16.865	-1.885	-0.048	B2		
SMC11	2	40443	-0.131	17.188	-1.562	-0.066	B3		
SMC15	1	8873	0.018	15.794	-2.956	0.096	B1		
SMC18	2	33376	-0.147	16.062	-2.688	0.017	B1	[MA93] 59	Em*
SMC39	4	17655	-0.190	16.085	-2.665	-0.120	B1		
SMC49	6	18899	-0.244	17.052	-1.698	-0.221	B3		
SMC54	6	26334	-0.112	15.484	-3.266	0.031	B0	[MA93] 284	Em*
SMC54	6	26058	0.038	17.216	-1.534	0.049	B3		
SMC64	5	30064	-0.001	16.907	-1.843	0.050	B2	2MASS J00503686-7258174	Em*
SMC64	5	30728	-0.164	16.200	-2.550	0.004	B2		
SMC67	5	57461	-0.116	17.267	-1.483	-0.069	B3		
SMC68	6	35590	-0.041	15.024	-3.726	0.086	B0	[M2002] SMC 17703 ?	Em*
SMC68	6	35764	-0.072	15.490	-3.260	0.112	B0	[SG2005] SMC 32	HXB
SMC68	6	38010	-0.071	14.890	-3.860	0.179	B0	[M2002] SMC 18341	Em*
SMC68	6	36917	-0.229	16.206	-2.544	-0.214	B2		
SMC68	6	37293	-0.113	16.243	-2.507	0.106	B2	[MA93] 426	Em*
SMC68	6	38765	-0.166	16.616	-2.134	-0.056	B2		
SMC68	8	14944	-0.184	16.234	-2.516	-0.079	B2		
SMC68	6	39644	-0.164	17.107	-1.643	-0.032	B3		
SMC69	5	7935	-0.110	15.739	-3.011	0.111	B1		
SMC69	5	6201	-0.077	16.784	-1.966	-0.003	B2		
SMC69	5	6818	-0.140	16.689	-2.061	-0.047	B2		
SMC69	5	5670	-0.153	17.076	-1.674	-0.074	B3		
SMC71	5	27502	-0.177	17.594	-1.156	0.065	B4		
SMC72	6	46694	-0.120	14.608	-4.142	-0.027	B0		
SMC72	6	46921	-0.148	15.372	-3.378	0.034	B0	[MA93] 492	Em*
SMC72	6	47659	-0.324	15.369	-3.381	-0.187	B0	[M2002] SMC 20976 ?	star
SMC73	5	46610	-0.174	17.022	-1.728	-0.065	B3		
SMC74	5	35145	-0.120	15.424	-3.326	0.142	B0	[MA93] 509	Em*
SMC89	7	40369	-0.240	16.133	-2.617	-0.155	B1		
SMC99	7	58735	-0.120	15.764	-2.986	0.000	B1	[MFH2007] SMC5-37162	B2IIIe
SMC104	7	22294	-0.062	17.149	-1.601	-0.077	B3		
SMC105	7	16723	-0.149	16.865	-1.885	-0.107	B2		

**Table C.2.** Be stars table2, continued

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC107	9	36804	-0.154	15.040	-3.710	-0.015	B0	[MFH2007] SMC5-64327	B3II-IIIe
SMC107	9	37317	-0.147	15.372	-3.378	-0.013	B0	Cl* NGC 330 ROB B36	Em*
SMC107	9	38203	-0.150	15.392	-3.358	-0.004	B0	[MFH2007] SMC5-37137	B2IIIe
SMC107	9	38679	-0.143	15.217	-3.533	-0.024	B0	[MFH2007] SMC5-13978	B3IIIe
SMC107	9	38683	-0.188	14.953	-3.797	-0.070	B0	Cl* NGC 330 ROB A15	Em*
SMC107	9	38865	-0.201	15.498	-3.252	-0.068	B0		
SMC107	9	38965	-0.061	15.196	-3.554	0.114	B0	Cl* NGC 330 ROB B6	B2IIIe
SMC107	9	39104	-0.223	15.041	-3.709	-0.150	B0	Cl* NGC 330 ROB A22	*iC
SMC107	9	39541	-0.188	14.966	-3.784	-0.122	B0	Cl* NGC 330 ROB B17	*iC
SMC107	9	40094	-0.169	15.088	-3.662	-0.082	B0	Cl* NGC 330 ROB B12	B2IIIe
SMC107	9	36907	-0.171	15.950	-2.800	-0.084	B1	Cl* NGC 330 KWBBE 471	*iC
SMC107	9	37301	-0.146	15.608	-3.142	-0.012	B1	Cl* NGC 330 ROB B34	*iC
SMC107	9	38467	-0.335	15.748	-3.002	-0.345	B1	Cl* NGC 330 KWBBE 219	Be*
SMC107	9	39366	-0.116	15.739	-3.011	-0.080	B1	Cl* NGC 330 KWBBE 439	*iC
SMC107	9	40319	-0.159	15.715	-3.035	-0.106	B1	Cl* NGC 330 KWBBE 442	*iC
SMC107	9	41361	-0.207	15.857	-2.893	-0.243	B1	Cl* NGC 330 KWBBE 448	*iC
SMC107	9	37894	-0.137	16.336	-2.414	-0.032	B2	Cl* NGC 330 ROB B9	*iC
SMC107	9	38540	-0.136	16.437	-2.313	0.012	B2	[MFH2007] SMC5-73581	B3IIIe
SMC107	9	39179	-0.168	16.205	-2.545	-0.205	B2	Cl* NGC 330 KWBBE 875	*iC
SMC107	9	39384	-0.210	16.847	-1.903	-0.025	B2		
SMC107	9	39478	-0.144	16.255	-2.495	-0.033	B2	[MFH2007] SMC5-44898	B2III-IVe
SMC107	9	41254	-0.138	16.564	-2.186	-0.031	B2	Cl* NGC 330 KWBBE 459	*iC
SMC107	9	38300	-0.128	17.065	-1.685	-0.146	B3	Cl* NGC 330 KWBBE 882	*iC
SMC107	9	38559	-0.188	17.227	-1.523	-0.088	B3	Cl* NGC 330 KWBBE 857	*iC
SMC107	9	39354	-0.206	16.957	-1.793	-0.216	B3		
SMC109	9	61137	-0.147	17.564	-1.186	0.056	B4		
SMC117	9	28212	-0.249	17.009	-1.741	-0.235	B3		
SMC117	12	36065	-0.222	17.014	-1.736	-0.042	B3		
SMC120	9	52820	-0.124	16.628	-2.122	-0.010	B2	[MA93] 1173	Em*
SMC120	9	52849	-0.114	16.311	-2.439	0.006	B2		
SMC120	11	11026	-0.139	17.533	-1.217	-0.012	B4		
SMC121	11	2977	-0.142	14.887	-3.863	0.057	B0	[M2002] SMC 48057	Em*
SMC121	11	3894	-0.130	16.113	-2.637	-0.051	B1	[MA93] 1200	Em*
SMC121	11	3329	-0.185	16.716	-2.034	-0.080	B2		
SMC124	9	53638	-0.146	16.146	-2.604	-0.058	B1		
SMC124	9	53423	-0.073	16.529	-2.221	-0.024	B2		
SMC124	9	53877	-0.217	16.799	-1.951	-0.065	B2		
SMC124	9	54376	-0.083	16.488	-2.262	0.063	B2	2MASS J01003020-7221299	Em*
SMC126	12	22724	-0.152	16.670	-2.080	-0.118	B2		

**Table C.2.** Be stars table2, continued

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC128	11	10309	-0.195	17.082	-1.668	-0.254	B3		
SMC134	11	23627	-0.072	14.842	-3.908	-0.056	B0	[MA93] 1364	Em*
SMC134	11	23610	-0.136	16.769	-1.981	-0.001	B2		
SMC134	11	24123	0.014	16.705	-2.045	0.019	B2	[MB2000] 224	Em*
SMC134	11	23713	-0.063	17.007	-1.743	-0.001	B3		
SMC134	11	23886	-0.258	17.155	-1.595	0.046	B3		
SMC134	11	23901	-0.092	17.089	-1.661	0.016	B3		
SMC134	11	23926	-0.104	17.144	-1.606	0.004	B3		
SMC134	11	23344	-0.183	17.603	-1.147	-0.030	B4		
SMC134	11	23667	-0.084	17.478	-1.272	0.026	B4		
SMC137	12	36860	-0.132	16.005	-2.745	0.035	B1		
SMC137	12	37291	-0.144	16.826	-1.924	-0.061	B2		
SMC137	12	36179	-0.136	17.154	-1.596	0.010	B3		
SMC137	12	36574	-0.102	17.449	-1.301	-0.073	B4		
SMC138	13	26557	-0.063	15.766	-2.984	0.097	B1	2MASS J01035409-7206083	Em*
SMC139	12	17338	-0.181	14.875	-3.875	-0.062	B0		
SMC139	12	17471	-0.076	15.492	-3.258	0.047	B0	[MA93] 1415	Em*
SMC139	12	17654	-0.021	15.051	-3.699	-0.161	B0	[MA93] 1420	Em*
SMC139	12	17893	-0.198	15.149	-3.601	-0.056	B0	[MA93] 1426	Em*
SMC139	12	17719	-0.317	15.969	-2.781	-0.198	B1		
SMC139	12	17952	-0.180	15.819	-2.931	-0.025	B1		
SMC139	12	17092	-0.218	16.548	-2.202	-0.078	B2		
SMC139	12	17132	-0.175	16.578	-2.172	0.022	B2		
SMC140	12	38008	-0.159	16.755	-1.995	-0.095	B2		
SMC142	11	34166	-0.194	15.580	-3.170	-0.075	B1		
SMC143	12	48420	-0.264	17.271	-1.479	-0.242	B3		
SMC144	11	37686	-0.149	17.689	-1.061	-0.204	B4		
SMC144	11	37554	-0.170	18.278	-0.472	-0.134	B6		
SMC155	14	30041	-0.178	15.319	-3.431	-0.046	B0	[MA93] 1630	Em*
SMC155	14	29773	-0.229	15.924	-2.826	-0.128	B1	[MA93] 1631	Em*
SMC155	14	29777	-0.171	15.528	-3.222	0.035	B1		
SMC198	6	49187	-0.088	17.017	-1.733	0.101	B3		
SMC198	6	50118	-0.076	17.403	-1.347	0.061	B4		
SMC198	6	50141	-0.107	17.569	-1.181	0.130	B4		

**Table C.3.** Table 1 of candidate Be stars: same as for table C.1

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC002	2	sc1	11621	35532	0.9	0 37 41.567	-73 37 4.805	0 37 41.720	-73 37 4.300	15.941	15.886	15.790	-0.055	0.151	0.060	8.4	1
SMC008	2	sc2	34493	35344	1.0	0 40 35.389	-73 23 56.521	0 40 35.540	-73 23 56.300	17.218	17.103	17.231	-0.115	-0.013	0.070	8	1
SMC009	2	sc2	35862	35312	0.8	0 40 44.245	-73 23 14.832	0 40 44.350	-73 23 14.600	16.393	16.291	16.447	-0.102	-0.054	0.070	8	1
SMC009	2	sc2	35791	35497	0.8	0 40 37.924	-73 23 12.782	0 40 38.030	-73 23 12.500	17.774	17.671	17.753	-0.104	0.021	0.070	8	1
SMC011	2	sc2	40080	61911	0.7	0 41 6.174	-73 21 4.138	0 41 6.250	-73 21 3.800	17.586	17.345	17.276	-0.241	0.309	0.080	7.9	1
SMC011	2	sc2	40465	64097	0.7	0 41 6.581	-73 20 50.625	0 41 6.650	-73 20 50.300	17.915	17.847	17.877	-0.068	0.038	0.080	7.9	1
SMC015	1	sc3	9526	20020	1.0	0 42 52.422	-73 17 28.318	0 42 52.370	-73 17 27.800	16.828	16.789	16.768	-0.039	0.060	0.100	8.1	1
SMC016	1	sc3	21973	28069	1.1	0 42 48.068	-73 10 13.504	0 42 48.150	-73 10 12.900	16.420	16.422	16.315	0.002	0.105	0.080	8.3	1
SMC39	6	sc4	11608	103852	1.0	0 47 18.232	-73 28 20.732	0 47 18.380	-73 28 20.300	17.471	17.418	17.620	-0.053	-0.149	0.110	8	1
SMC39	4	sc4	17735	101412	1.0	0 47 15.786	-73 28 45.515	0 47 15.970	-73 28 45.200	17.712	17.728	17.489	0.016	0.222	0.110	8	1
SMC39	4	sc4	17751	101821	1.1	0 47 25.005	-73 28 50.983	0 47 24.900	-73 28 50.400	18.010	17.978	17.995	-0.032	0.016	0.110	8	1
SMC39	4	sc4	17374	101819	0.8	0 47 7.878	-73 28 51.076	0 47 8.010	-73 28 50.800	18.081	18.154	17.810	0.073	0.271	0.110	8	1
SMC43	4	sc4?	47538	167239	1.0	0 47 54.893	-73 13 12.824	0 47 54.890	-73 13 12.100	15.847	15.821	15.750	-0.026	0.097	0.090	8.5	1
SMC47	5	sc4	26309	183310	1.3	0 48 20.087	-72 58 45.794	0 48 20.220	-72 58 45.800	17.853	17.812	17.900	-0.040	-0.047	0.120	7.8	1
SMC49	6	sc5	19436	11592	1.4	0 48 35.491	-73 24 59.553	0 48 35.720	-73 24 59.200	16.799	16.647	16.976	-0.152	-0.176	0.060	7	1
SMC54	6	sc5	25290	95233	1.3	0 49 18.151	-73 22 31.079	0 49 18.350	-73 22 30.900	16.372	16.308	16.425	-0.064	-0.053	0.100	8	1
SMC61	6	sc5	40386	185177	1.0	0 50 2.240	-73 15 39.100	0 50 2.380	-73 15 39.100	17.149	17.106	17.092	-0.043	0.056	0.120	7.4	1
SMC61	6	sc5	40812	106178	1.0	0 49 57.657	-73 15 23.611	0 49 57.800	-73 15 23.600	18.183	18.007	18.054	-0.175	0.128	0.120	7.4	1
SMC64	5	sc5	30736	208709	0.6	0 50 39.685	-72 58 18.552	0 50 39.650	-72 58 18.700	17.716	17.698	17.633	-0.018	0.083	0.100	8.1	1
SMC64	5	sc5	32158	214394	0.4	0 50 41.541	-72 57 36.104	0 50 41.530	-72 57 36.300	17.624	17.580	17.596	-0.045	0.028	0.100	8.1	1
SMC64	5	sc5	30619	208690	0.2	0 50 42.575	-72 58 23.876	0 50 42.610	-72 58 24.000	17.990	18.017	17.955	0.027	0.035	0.100	8.1	1
SMC64	5	sc5	32232	214397	0.5	0 50 43.981	-72 57 35.491	0 50 43.960	-72 57 35.700	18.330	18.271	18.201	-0.059	0.129	0.100	8.1	1
SMC66	6	sc5	49018	271189	0.9	0 50 52.018	-73 12 9.134	0 50 52.130	-73 12 9.100	17.186	17.096	17.222	-0.090	-0.035	0.090	7.8	1
SMC68	6	sc5	39658	261315	0.6	0 50 58.566	-73 16 39.046	0 50 58.570	-73 16 38.800	18.107	18.128	17.997	0.021	0.109	0.090	7.7	1
SMC69	6	sc5	53619	271156	0.8	0 51 11.718	-73 10 8.483	0 51 11.690	-73 10 8.100	16.397	16.278	16.405	-0.119	-0.008	0.080	7.6	1
SMC69	5	sc5	7652	271169	1.1	0 51 11.248	-73 9 20.449	0 51 11.150	-73 9 20.800	16.559	16.483	16.505	-0.077	0.054	0.080	7.6	1
SMC69	5	sc5	7542	271354	1.0	0 51 12.972	-73 9 20.447	0 51 12.890	-73 9 20.800	17.342	17.287	17.308	-0.055	0.033	0.080	7.6	1
SMC69	5	sc5	6624	271681	1.3	0 51 21.171	-73 9 54.629	0 51 21.050	-73 9 54.800	17.644	17.502	17.734	-0.141	-0.090	0.080	7.6	1
SMC69	5	sc5	6231	272406	1.0	0 51 16.995	-73 10 1.924	0 51 17.110	-73 10 2.800	18.490	18.414	18.503	-0.078	-0.011	0.080	7.6	1
SMC72	6	sc6	45847	17909	0.7	0 51 39.843	-73 14 10.301	0 51 39.860	-73 14 9.900	17.669	17.614	17.676	-0.055	-0.008	0.080	7.6	1

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**Table C.3.** Candidate Be stars table1, continued

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC99	7	sc7	58955	70940	1.4	0 54 41.207	-72 28 2.335	0 54 41.320	-72 28 2.200	17.371	17.282	17.352	-0.089	0.019	0.080	7.6	1
SMC107	9	sc7	38635	206127	1.3	0 56 20.764	-72 27 53.744	0 56 20.870	-72 27 54.300	17.003	16.972	16.903	-0.031	0.100	0.100	7.5	1
SMC107	9	sc7	38660	206138	0.6	0 56 23.650	-72 27 52.520	0 56 23.660	-72 27 52.200	17.210	17.178	17.124	-0.032	0.086	0.100	7.5	1
SMC107	9	sc7	39170	206197	0.8	0 56 2.796	-72 27 20.533	0 56 2.800	-72 27 20.100	17.117	17.007	17.145	-0.110	-0.028	0.100	7.5	1
SMC107	9	sc7	35214	202114	1.4	0 56 13.101	-72 29 41.006	0 56 13.200	-72 29 40.500	17.593	17.554	17.541	-0.039	0.052	0.100	7.5	1
SMC107	9	sc7	35856	138111	1.1	0 55 59.550	-72 29 6.606	0 55 59.610	-72 29 6.000	18.434	18.374	18.397	-0.059	0.037	0.100	7.5	1
SMC107	9	sc7	37709	206326	1.4	0 56 20.117	-72 28 22.155	0 56 20.220	-72 28 21.800	17.972	17.875	17.815	-0.098	0.157	0.100	7.5	1
SMC109	9	sc7?	61409	52826	0.7	0 57 29.388	-72 15 50.642	0 57 29.430	-72 15 50.400	15.439	15.309	15.297	-0.132	0.143	0.040	7.7	1
SMC115	11	sc8	17373	107346	1.1	0 58 32.446	-72 17 2.726	0 58 32.400	-72 17 2.500	17.241	17.159	17.151	-0.082	0.090	0.070	7.3	2
SMC120	9	?	52588	201615	1.3	0 59 58.683	-72 22 10.852	0 59 58.770	-72 22 10.600	17.046	16.935	17.105	-0.111	-0.060	0.070	7.7	1
SMC120	9	?	53224	204590	0.7	1 0 0.041	-72 21 48.414	1 0 0.080	-72 21 48.100	17.901	17.827	17.812	-0.073	0.089	0.070	7.7	2
SMC121	12	sc8	52864	198629	0.5	1 0 7.851	-72 27 23.470	1 0 7.860	-72 27 23.300	17.282	17.176	17.201	-0.107	0.081	0.080	7.9	1
SMC124	11	sc8	11973	33070	1.5	1 0 39.500	-72 22 30.342	1 0 39.600	-72 22 29.800	17.077	16.985	17.080	-0.093	-0.002	0.060	7.6	1
SMC124	9	sc8	53703	36128	0.7	1 0 28.993	-72 21 50.809	1 0 29.030	-72 21 50.400	17.738	17.602	17.872	-0.135	-0.134	0.060	7.6	1
SMC124	9	sc8	54177	36143	0.4	1 0 37.635	-72 21 40.713	1 0 37.640	-72 21 40.300	17.885	17.757	18.018	-0.128	-0.132	0.060	7.6	1
SMC126	12	sc9	22431	61658	0.6	1 1 8.090	-72 45 9.496	1 1 8.130	-72 45 9.300	15.979	15.960	15.907	-0.019	0.070	0.070	8	1
SMC134	11	sc9	23845	168530	0.5	1 3 10.387	-72 16 17.644	1 3 10.380	-72 16 17.600	17.564	17.470	17.546	-0.094	0.019	0.050	7.8	1
SMC134	11	sc9	23538	168518	0.9	1 3 13.945	-72 16 28.321	1 3 14.020	-72 16 28.200	17.738	17.553	17.902	-0.183	-0.165	0.050	7.8	1
SMC137	12	sc9	35635	150055	0.5	1 3 27.910	-72 39 39.381	1 3 27.920	-72 39 39.200	17.517	17.402	17.527	-0.115	-0.010	0.060	7.6	1
SMC137	12	sc9	35836	152784	0.7	1 3 15.000	-72 39 23.644	1 3 15.060	-72 39 23.500	17.483	17.312	17.641	-0.170	-0.158	0.060	7.6	1
SMC140	12	sc10	38692	52204	0.7	1 4 19.306	-72 38 31.773	1 4 19.300	-72 38 31.500	15.897	15.746	16.030	-0.151	-0.133	0.090	7.2	1
SMC147	13	sc10	33231	110425	0.6	1 5 8.431	-71 59 54.859	1 5 8.410	-71 59 54.900	15.790	15.684	15.762	-0.106	0.028	0.060	7.1	1
SMC198	6	sc5	49860	190524	0.8	0 50 5.040	-73 11 14.452	0 50 5.140	-73 11 14.400	16.452	16.377	16.348	-0.075	0.104	0.060	7.9	1
SMC198	6	sc5	49985	190635	0.9	0 50 11.713	-73 11 14.852	0 50 11.830	-73 11 14.800	17.110	17.027	17.043	-0.083	0.067	0.060	7.9	1

**Table C.4.** Table 2 of candidate Be stars: same as for table C.2

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC2	2	11621	-0.115	15.755	-2.995	0.065	B1		
SMC8	2	34493	-0.185	17.001	-1.749	-0.114	B3		
SMC9	2	35862	-0.172	16.176	-2.574	-0.155	B1		
SMC9	2	35791	-0.174	17.557	-1.193	-0.080	B4		
SMC11	2	40080	-0.321	17.338	-1.412	0.194	B3		
SMC11	2	40465	-0.148	17.667	-1.083	-0.077	B4		
SMC15	1	9526	-0.139	16.518	-2.232	-0.084	B2		
SMC16	1	21973	-0.078	16.172	-2.578	-0.010	B1		
SMC39	6	11608	-0.163	17.130	-1.620	-0.307	B3		
SMC39	4	17751	-0.142	17.669	-1.081	-0.142	B4		
SMC39	4	17374	-0.037	17.740	-1.010	0.113	B4		
SMC39	4	17735	-0.094	17.371	-1.379	0.064	B4		
SMC43	4	47538	-0.116	15.568	-3.182	-0.033	B1		
SMC47	5	26309	-0.160	17.481	-1.269	-0.220	B4		
SMC49	6	19436	-0.212	16.613	-2.137	-0.262	B2		
SMC54	6	25290	-0.164	16.062	-2.688	-0.197	B1		
SMC61	6	40386	-0.163	16.777	-1.973	-0.117	B2		
SMC61	6	40812	-0.295	17.811	-0.939	-0.045	B5		
SMC64	5	32158	-0.145	17.314	-1.436	-0.116	B3		
SMC64	5	30619	-0.073	17.680	-1.070	-0.109	B4		
SMC64	5	30736	-0.118	17.406	-1.344	-0.061	B4		
SMC64	5	32232	-0.159	18.020	-0.730	-0.015	B5		
SMC66	6	49018	-0.180	16.907	-1.843	-0.165	B2		
SMC68	6	39658	-0.069	17.828	-0.922	-0.021	B5		
SMC69	6	53619	-0.199	16.149	-2.601	-0.123	B1		
SMC69	5	7652	-0.157	16.311	-2.439	-0.061	B2		
SMC69	5	7542	-0.135	17.094	-1.656	-0.082	B3		
SMC69	5	6624	-0.221	17.396	-1.354	-0.205	B4		
SMC69	5	6231	-0.158	18.242	-0.508	-0.126	B6		
SMC72	6	45847	-0.135	17.421	-1.329	-0.123	B4		

**Table C.4.** Candidate Be stars table2, continued

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC99	7	58955	-0.169	17.123	-1.627	-0.096	B3		
SMC107	9	38635	-0.131	16.693	-2.057	-0.044	B2		
SMC107	9	38660	-0.132	16.900	-1.850	-0.058	B2		
SMC107	9	39170	-0.210	16.807	-1.943	-0.172	B2	CI* NGC 330 ROB B18	*iC
SMC107	9	35214	-0.139	17.283	-1.467	-0.092	B3		
SMC107	9	37709	-0.198	17.662	-1.088	0.013	B4		
SMC107	9	35856	-0.159	18.124	-0.626	-0.107	B5	CI* NGC 330 G 89	*iC
SMC109	9	61409	-0.172	15.315	-3.435	0.085	B0		
SMC115	11	17373	-0.152	17.024	-1.726	-0.011	B3		
SMC120	9	52588	-0.181	16.829	-1.921	-0.161	B2		
SMC120	9	53224	-0.143	17.684	-1.066	-0.012	B4		
SMC121	12	52864	-0.187	17.034	-1.716	-0.034	B3		
SMC124	11	11973	-0.153	16.891	-1.859	-0.088	B2		
SMC124	9	53703	-0.195	17.552	-1.198	-0.220	B4		
SMC124	9	54177	-0.188	17.699	-1.051	-0.218	B4		
SMC126	12	22431	-0.089	15.762	-2.988	-0.031	B1		
SMC134	11	23538	-0.233	17.583	-1.167	-0.237	B4		
SMC134	11	23845	-0.144	17.409	-1.341	-0.053	B4		
SMC137	12	35635	-0.175	17.331	-1.419	-0.096	B3		
SMC137	12	35836	-0.230	17.297	-1.453	-0.244	B3		
SMC140	12	38692	-0.241	15.618	-3.132	-0.263	B1		
SMC147	13	33231	-0.166	15.604	-3.146	-0.058	B1	[M2002] SMC 61168	Em*
SMC198	6	49860	-0.135	16.266	-2.484	0.018	B2		
SMC198	6	49985	-0.143	16.924	-1.826	-0.019	B2		

**Table C.5.** Table 1 of Ae and Oe stars: cross-correlation WFI with Ogle: same as for table C.1

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC11	2	sc2	39734	63847	0.8	0 41 2.835	-73 21 11.479	0 41 2.860	-73 21 12.600	20.762	20.832	20.417	0.069	0.344	0.080	7.9	1
SMC39	4	sc4	18277	104655	1.3	0 47 7.353	-73 28 24.163	0 47 7.390	-73 28 23.200	19.937	19.822	19.993	-0.115	-0.056	0.110	8	1
SMC39	6	sc4	11532	106710	0.6	0 47 13.047	-73 28 19.429	0 47 12.980	-73 28 19.300	20.467	20.315	20.476	-0.152	-0.009	0.110	8	1
SMC49	6	sc5	20245	14801	0.9	0 48 43.036	-73 24 39.905	0 48 42.950	-73 24 40.800	20.820	21.054	20.668	0.233	0.151	0.060	7	1
SMC89	7	sc6	42527	169518	1.2	0 52 52.054	-72 37 25.012	0 52 52.030	-72 37 26.400	20.387	20.522	20.439	0.135	-0.052	0.090	7.3	1
SMC141	12	sc10	41782	53127	1.4	1 4 35.572	-72 36 58.556	1 4 35.690	-72 36 59.300	19.840	19.945	19.684	0.104	0.155	0.090	8.2	1
SMC149	11	sc10	44134	108869	1.2	1 5 24.988	-72 2 31.146	1 5 25.040	-72 2 32.500	19.802	19.629	19.607	-0.173	0.195	0.080	8.2	1
SMC17	2	sc3	33282	63371	1.1	0 43 36.954	-73 26 38.578	0 43 36.910	-73 26 37.800	14.178	14.361	13.847	0.181	0.331	0.100	7.9	1
SMC33	4	sc4	25961	56763	1.3	0 46 11.608	-73 23 25.468	0 46 11.790	-73 23 25.000	14.546	14.484	14.544	-0.061	0.001	0.150	7.2	1
SMC71	5	sc5	26201	288705	0.3	0 51 28.049	-73 1 0.976	0 51 28.040	-73 1 1.300	14.069	14.011	13.988	-0.058	0.080	0.070	7.5	1
SMC105	7	sc7	18826	110080	0.7	0 55 48.587	-72 52 7.467	0 55 48.600	-72 52 7.100	14.777	14.717	14.635	-0.060	0.142	0.110	8	1
SMC107	9	sc7	37633	205873	1.9	0 56 7.039	-72 28 13.947	0 56 7.180	-72 28 13.500	13.395	13.423	13.230	0.028	0.165	0.100	7.5	1
SMC187	4	sc4	29240	106867	1.0	0 47 4.127	-73 22 11.456	0 47 4.230	-73 22 10.900	14.448	14.427	14.255	-0.022	0.193	0.040	8.2	2

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**Table C.6.** Table 2 of Ae and Oe stars: same as for table C.2

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC11	2	39734	-0.011	20.514	1.764	0.229	A3-A4		
SMC39	4	18277	-0.225	19.596	0.846	-0.214	A0		
SMC39	6	11532	-0.262	20.126	1.376	-0.167	A2		
SMC49	6	20245	0.173	20.634	1.884	0.065	A3-A4		
SMC89	7	42527	0.045	20.108	1.358	-0.182	A2		
SMC141	12	41782	0.014	19.561	0.811	0.025	A0		
SMC149	11	44134	-0.253	19.554	0.804	0.080	A0		
SMC17	2	33282	0.081	13.868	-4.882	0.187	O8	LHA 115-S 3	A7/H AeBe?
SMC33	4	25961	-0.211	14.081	-4.669	-0.215	O8		
SMC71	5	26201	-0.128	13.852	-4.898	-0.021	O8	[MA93] 470	Em*
SMC105	7	18826	-0.170	14.436	-4.314	-0.016	O9	2MASS J00554860-7252073	Em*
SMC107	9	37633	-0.072	13.085	-5.665	0.021	O5	[MFH2007] SMC5-82819	B2IIIe
SMC187	4	29240	-0.062	14.324	-4.426	0.135	O9	LIN 88	Em*



**Table C.7.** Table 1 of other kind of emission line stars (not Main Sequence stars): same as for table C.1.

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC008	2	sc2	32681	33368	1.2	0 40 22.224	-73 24 49.108	0 40 22.420	-73 24 48.900	17.847	18.481	17.071	0.631	0.775	0.070	8	1
SMC008	2	sc2	33371	35303	1.5	0 40 24.878	-73 24 26.225	0 40 25.120	-73 24 26.000	18.069	19.699	15.803	1.622	2.264	0.070	8	1
SMC008	2	sc2	32765	33369	1.3	0 40 23.181	-73 24 46.718	0 40 23.390	-73 24 46.500	18.371	19.231	17.328	0.856	1.042	0.070	8	1
SMC008	2	sc2	33200	34401	0.5	0 40 27.520	-73 24 36.202	0 40 27.470	-73 24 36.800	20.375	19.699	20.097	-0.675	0.277	0.070	8	2
SMC015	1	sc3	9969	19977	1.0	0 42 54.809	-73 17 15.972	0 42 54.770	-73 17 15.400	16.644	18.242	15.152	1.592	1.491	0.100	8.1	1
SMC015	1	sc3	9516	19975	1.1	0 42 53.612	-73 17 29.583	0 42 53.540	-73 17 29.000	17.246	18.649	15.412	1.397	1.834	0.100	8.1	1
SMC015	1	sc3	48053	23189	1.3	0 42 49.013	-73 17 27.348	0 42 48.920	-73 17 28.600	20.962	21.551	20.819	0.587	0.143	0.100	8.1	1
SMC39	4	sc4	18580	103684	0.9	0 47 10.289	-73 28 17.794	0 47 10.450	-73 28 17.500	14.990	15.214	14.456	0.222	0.534	0.110	8	2
SMC39	4	sc4	18288	103753	0.9	0 47 2.490	-73 28 21.407	0 47 2.640	-73 28 21.100	17.164	17.561	16.477	0.394	0.687	0.110	8	1
SMC39	4	sc4	17311	101180	1.2	0 47 17.356	-73 28 59.579	0 47 17.590	-73 28 59.400	16.857	18.325	15.386	1.462	1.470	0.110	8	1
SMC39	4	sc4	18196	103749	0.8	0 47 4.182	-73 28 24.993	0 47 4.330	-73 28 24.900	17.483	18.355	16.460	0.868	1.022	0.110	8	1
SMC43	4	sc4?	46790	167294	1.1	0 47 51.979	-73 13 33.964	0 47 51.990	-73 13 33.200	16.516	16.739	15.989	0.221	0.526	0.090	8.5	1
SMC47	5	sc4	25512	183229	1.1	0 48 20.914	-72 59 9.443	0 48 20.920	-72 59 8.700	19.375	20.016	18.423	0.639	0.951	0.120	7.8	1
SMC49	6	sc5	18987	11482	1.5	0 48 35.841	-73 25 13.652	0 48 36.080	-73 25 13.300	17.588	18.872	16.310	1.279	1.277	0.060	7	1
SMC49	6	sc5	20941	11627	1.5	0 48 35.867	-73 24 14.297	0 48 36.110	-73 24 14.000	17.610	18.370	16.729	0.757	0.880	0.060	7	1
SMC49	6	sc5	19536	14591	0.7	0 48 39.519	-73 25 0.760	0 48 39.440	-73 25 1.500	21.074	20.055	20.588	-1.019	0.485	0.060	7	1
SMC54	6	sc5	26281	95246	1.4	0 49 19.138	-73 22 2.087	0 49 19.360	-73 22 1.900	16.511	16.807	16.053	0.295	0.457	0.100	8	1
SMC54	6	sc5	25893	95328	1.3	0 49 17.931	-73 22 13.403	0 49 18.140	-73 22 13.300	18.111	19.450	16.991	1.334	1.120	0.100	8	1
SMC61	6	sc5	40871	105869	1.2	0 49 59.622	-73 15 25.497	0 49 59.790	-73 15 25.500	17.568	18.843	16.191	1.270	1.376	0.120	7.4	1
SMC61	6	sc5	40887	185816	0.8	0 50 1.946	-73 15 27.744	0 50 2.010	-73 15 28.800	18.875	18.668	19.263	-0.206	-0.387	0.120	7.4	1
SMC61	6	sc5	40536	106627	0.6	0 49 59.189	-73 15 34.541	0 49 59.150	-73 15 34.500	19.446	20.264	18.538	0.815	0.907	0.120	7.4	1
SMC64	5	sc5	31529	214027	0.5	0 50 48.992	-72 58 2.871	0 50 48.970	-72 58 3.200	17.448	19.759	15.951	2.303	1.495	0.100	8.1	1
SMC67	5	sc5	56955	235186	0.2	0 50 43.917	-72 43 40.013	0 50 43.950	-72 43 40.200	17.593	18.785	16.342	1.188	1.250	0.080	8.2	1
SMC67	5	sc5	57052	316842	0.9	0 51 5.906	-72 43 56.336	0 51 5.860	-72 43 56.300	18.143	18.780	17.275	0.634	0.868	0.080	8.2	1
SMC68	6	sc5	37450	260864	0.8	0 50 49.753	-73 17 26.850	0 50 49.850	-73 17 26.600	17.343	18.795	15.865	1.446	1.477	0.090	7.7	1
SMC68	6	sc5	39689	264985	0.3	0 51 7.582	-73 16 42.655	0 51 7.570	-73 16 42.800	18.230	18.419	18.710	0.189	-0.478	0.090	7.7	1
SMC68	6	sc5	37302	260965	0.6	0 50 52.260	-73 17 32.230	0 50 52.310	-73 17 32.000	18.215	19.388	17.026	1.169	1.188	0.090	7.7	1
SMC68	6	sc5	36375	261183	0.7	0 50 58.503	-73 18 2.273	0 50 58.580	-73 18 2.000	18.643	19.512	17.612	0.865	1.030	0.090	7.7	1
SMC68	8	sc5	12982	182074	0.9	0 50 42.121	-73 17 36.784	0 50 42.220	-73 17 37.800	20.727	20.132	19.675	-0.595	1.051	0.090	7.7	1
SMC69	5	sc5	6154	271102	1.2	0 51 5.335	-73 9 56.310	0 51 5.230	-73 9 56.600	16.829	17.790	15.601	0.956	1.227	0.080	7.6	2
SMC69	5	sc5	5453	271292	1.4	0 51 12.691	-73 10 22.098	0 51 12.560	-73 10 22.400	18.595	19.523	17.409	0.924	1.186	0.080	7.6	1
SMC69	5	sc5	5851	271393	1.2	0 51 7.504	-73 10 7.123	0 51 7.420	-73 10 6.700	19.455	20.437	18.423	0.978	1.032	0.080	7.6	1

**Table C.7.** Other emission-line star table1, continued

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC70	6	sc5	39108	261948	1.1	0 51 25.509	-73 17 9.571	0 51 25.520	-73 17 8.800	19.636	20.363	18.654	0.724	0.981	0.090	7.8	1
SMC71	5	sc5	26433	288728	0.5	0 51 24.596	-73 0 51.497	0 51 24.660	-73 0 52.000	15.915	15.888	15.247	-0.028	0.667	0.070	7.5	1
SMC72	6	sc6	47906	17311	0.9	0 51 42.821	-73 13 27.500	0 51 42.780	-73 13 27.100	16.113	16.113	15.721	-0.001	0.392	0.080	7.6	2
SMC72	6	sc6	47440	18048	0.6	0 51 38.503	-73 13 23.609	0 51 38.500	-73 13 23.300	18.846	19.410	18.046	0.561	0.798	0.080	7.6	1
SMC73	5	sc6	47237	61592	0.7	0 51 44.171	-72 49 51.499	0 51 44.140	-72 49 51.500	18.021	18.971	16.946	0.947	1.074	0.110	8.2	1
SMC74	5	sc6	33275	49197	0.2	0 51 55.562	-72 57 52.561	0 51 55.590	-72 57 53.000	16.560	17.270	15.946	0.708	0.613	0.090	8.1	1
SMC74	5	sc6	34888	49148	1.4	0 52 0.303	-72 57 6.959	0 52 0.200	-72 57 7.300	17.253	18.608	15.902	1.349	1.350	0.090	8.1	1
SMC76	7	sc6	50781	85616	1.4	0 52 10.630	-72 31 34.209	0 52 10.740	-72 31 34.000	16.553	17.364	15.375	0.807	1.177	0.070	7.4	1
SMC82	7	sc6	5632	135623	1.0	0 52 49.039	-72 56 4.506	0 52 49.110	-72 56 4.000	18.102	19.196	16.876	1.089	1.225	0.100	7.8	1
SMC82	7	sc6	7335	136216	1.2	0 52 50.126	-72 55 15.543	0 52 50.220	-72 55 15.000	18.802	19.724	17.707	0.919	1.094	0.100	7.8	1
SMC89	7	sc6	40128	163933	1.4	0 52 55.540	-72 38 51.947	0 52 55.490	-72 38 51.300	19.677	20.519	18.336	0.838	1.340	0.090	7.3	1
SMC89	7	sc6	40967	164025	0.6	0 52 52.005	-72 38 20.721	0 52 52.060	-72 38 21.300	20.500	20.744	18.711	0.241	1.787	0.090	7.3	1
SMC90	8	sc6	5703	180279	0.3	0 53 8.526	-73 22 21.661	0 53 8.530	-73 22 21.700	18.297	18.989	17.388	0.689	0.908	0.110	8.5	1
SMC90	8	sc6	4344	94604	0.3	0 52 58.810	-73 22 52.004	0 52 58.800	-73 22 52.100	18.366	19.064	17.527	0.695	0.838	0.110	8.5	1
SMC98	8	sc7	27738	8705	0.8	0 54 48.652	-73 13 45.658	0 54 48.760	-73 13 45.600	17.394	18.378	16.267	0.980	1.126	0.070	8	1
SMC98	8	sc7	28402	8710	0.8	0 54 50.962	-73 13 29.594	0 54 51.070	-73 13 29.600	17.466	18.561	16.292	1.090	1.173	0.070	8	1
SMC98	8	sc7	28567	8717	0.9	0 54 39.527	-73 13 17.041	0 54 39.650	-73 13 17.000	17.813	18.826	16.717	1.009	1.094	0.070	8	1
SMC98	8	sc7	29408	8820	0.8	0 54 49.071	-73 13 1.449	0 54 49.180	-73 13 1.400	18.625	19.631	17.551	1.002	1.073	0.070	8	1
SMC99	7	sc7	59064	70814	1.4	0 54 45.740	-72 28 31.559	0 54 45.850	-72 28 31.500	16.927	18.634	15.460	1.701	1.465	0.080	7.6	1
SMC99	7	sc7	59097	70929	1.2	0 54 54.170	-72 28 20.204	0 54 54.270	-72 28 20.100	18.072	19.122	16.975	1.046	1.096	0.080	7.6	1
SMC99	7	sc7	57172	70909	1.0	0 54 54.435	-72 27 23.662	0 54 54.400	-72 27 23.400	19.261	20.806	17.677	1.539	1.582	0.080	7.6	1
SMC104	7	sc7	23453	115132	0.9	0 55 27.480	-72 49 38.621	0 55 27.560	-72 49 38.400	20.744	20.895	15.398	0.140	5.341	0.120	8.6	1
SMC105	7	sc7	17563	110095	0.7	0 55 49.334	-72 52 44.660	0 55 49.390	-72 52 44.400	17.005	18.626	15.350	1.614	1.653	0.110	8	1
SMC105	7	sc7	18620	110103	0.8	0 55 41.881	-72 52 8.441	0 55 41.950	-72 52 8.200	16.981	18.609	15.413	1.621	1.567	0.110	8	1
SMC105	7	sc7	17400	110205	0.7	0 55 54.143	-72 52 52.216	0 55 54.200	-72 52 52.000	18.480	19.437	17.059	0.952	1.420	0.110	8	1
SMC107	9	sc7	37803	205874	1.8	0 56 9.280	-72 28 9.599	0 56 9.410	-72 28 9.200	14.539	15.533	13.206	0.990	1.332	0.100	7.5	1
SMC107	9	sc7	37219	205975	0.9	0 56 6.388	-72 28 28.089	0 56 6.440	-72 28 27.600	17.271	17.794	16.418	0.521	0.852	0.100	7.5	1
SMC107	9	sc7	39390	206186	1.5	0 56 25.705	-72 27 31.044	0 56 25.820	-72 27 30.700	17.236	99.999	17.143	9.999	0.093	0.100	7.5	1
SMC107	9	sc7	40364	206615	1.2	0 56 30.668	-72 27 2.245	0 56 30.750	-72 27 1.800	17.417	18.522	18.047	1.104	-0.629	0.100	7.5	1
SMC107	9	sc7	38179	206959	1.9	0 56 17.677	-72 28 4.410	0 56 17.580	-72 28 4.000	18.074	17.720	18.214	-0.353	-0.140	0.100	7.5	1
SMC107	9	sc7	38481	209303	1.3	0 56 18.013	-72 27 57.427	0 56 17.950	-72 27 57.300	17.906	17.011	17.857	-0.894	0.049	0.100	7.5	1
SMC107	9	sc7	38214	209255	1.2	0 56 19.593	-72 28 1.628	0 56 19.680	-72 28 2.600	19.780	99.999	19.508	9.999	0.271	0.100	7.5	1
SMC107	9	sc7	38775	209506	1.5	0 56 6.528	-72 27 36.446	0 56 6.540	-72 27 38.200	20.654	20.961	20.177	0.305	0.477	0.100	7.5	1

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Table C.7. Other emission-line star table1, continued

Cluster	Image WFI	Image Ogle	ID WFI	ID Ogle	r "	RA(2000) WFI	DEC(2000) WFI	RA(2000) Ogle	DEC(2000) Ogle	V	B	I	B-V	V-I	E[B-V]	log(t)	Mult
SMC109	9	sc7?	61352	52936	0.9	0 57 31.114	-72 16 0.786	0 57 31.170	-72 16 0.400	17.537	17.554	17.094	0.016	0.443	0.040	7.7	1
SMC109	9	sc7?	61387	54360	1.3	0 57 29.499	-72 15 44.768	0 57 29.550	-72 15 45.800	18.637	99.999	19.054	9.999	-0.416	0.040	7.7	1
SMC109	9	sc7?	61314	56075	1.3	0 57 30.225	-72 15 58.665	0 57 30.190	-72 15 59.800	19.285	18.798	18.822	-0.487	0.463	0.040	7.7	1
SMC117	9	sc8	25911	139438	1.7	0 59 8.344	-72 36 55.340	0 59 8.460	-72 36 55.000	17.504	18.668	16.290	1.159	1.213	0.130	8.3	1
SMC117	9	sc8	27255	139451	1.7	0 59 10.979	-72 36 17.866	0 59 11.100	-72 36 17.600	17.114	18.590	15.712	1.471	1.400	0.130	8.3	1
SMC117	9	sc8	27276	139453	1.7	0 59 9.653	-72 36 15.719	0 59 9.770	-72 36 15.500	17.595	18.946	16.228	1.346	1.366	0.130	8.3	1
SMC117	9	sc8	27278	140923	0.8	0 59 15.301	-72 36 19.516	0 59 15.270	-72 36 18.900	20.172	99.999	19.687	9.999	0.485	0.130	8.3	1
SMC120	9	?	52998	201623	0.8	0 59 59.006	-72 21 56.125	0 59 59.060	-72 21 56.000	18.319	99.999	17.052	9.999	1.266	0.070	7.7	1
SMC121	11	sc8	3908	198577	1.0	1 0 8.721	-72 27 27.194	1 0 8.770	-72 27 26.600	17.640	18.939	16.309	1.294	1.329	0.080	7.9	1
SMC121	11	sc8	3672	198575	0.9	1 0 6.841	-72 27 36.247	1 0 6.880	-72 27 35.700	17.762	19.061	16.428	1.294	1.333	0.080	7.9	2
SMC121	11	sc8	2725	198609	1.0	1 0 14.928	-72 28 17.309	1 0 14.990	-72 28 16.800	17.989	19.016	16.644	1.023	1.345	0.080	7.9	1
SMC124	9	sc8	53362	32985	1.0	1 0 30.251	-72 22 4.533	1 0 30.310	-72 22 4.100	17.160	18.732	15.705	1.566	1.454	0.060	7.6	1
SMC124	9	sc8	53549	33086	0.7	1 0 36.792	-72 22 0.983	1 0 36.830	-72 22 1.400	18.625	20.479	17.559	1.849	1.064	0.060	7.6	1
SMC129	12	sc9	44327	70395	0.9	1 1 51.493	-72 33 38.625	1 1 51.570	-72 33 38.500	17.442	18.656	16.184	1.210	1.257	0.090	7.3	1
SMC129	12	sc9	43061	70615	1.0	1 1 47.253	-72 34 17.029	1 1 47.220	-72 34 16.700	18.763	19.141	17.541	0.374	1.221	0.090	7.3	1
SMC139	12	sc10	17345	1376	1.0	1 3 48.779	-72 49 36.257	1 3 48.790	-72 49 37.600	19.455	19.620	19.065	0.164	0.390	0.070	7.5	1
SMC139	12	sc10	18035	3901	1.0	1 3 56.135	-72 49 21.478	1 3 56.170	-72 49 22.800	19.582	99.999	19.078	9.999	0.503	0.070	7.5	1
SMC141	12	sc10	41542	52186	1.2	1 4 30.456	-72 37 3.988	1 4 30.400	-72 37 3.800	15.288	15.755	14.616	0.465	0.671	0.090	8.2	1
SMC142	11	sc10	34225	70818	0.2	1 4 37.496	-72 9 38.565	1 4 37.510	-72 9 38.700	17.239	17.092	17.584	-0.147	-0.344	0.060	7.3	1
SMC145	13	sc10	34943	111052	1.1	1 5 3.973	-71 59 25.544	1 5 3.920	-71 59 26.100	20.125	99.999	18.893	9.999	1.231	0.070	7.9	1
SMC149	13	sc10	32199	108122	0.6	1 5 20.094	-72 2 12.586	1 5 20.150	-72 2 12.600	16.407	16.972	15.675	0.562	0.731	0.080	8.2	1
SMC149	13	sc10	31744	108108	0.9	1 5 25.028	-72 2 35.103	1 5 25.110	-72 2 35.200	16.249	16.856	15.478	0.605	0.770	0.080	8.2	1
SMC156	14	sc11	12631	42339	1.1	1 7 32.126	-72 45 40.562	1 7 32.210	-72 45 40.200	15.747	16.192	15.085	0.443	0.661	0.090	8.2	1
SMC156	14	sc11	11524	40376	1.0	1 7 36.005	-72 46 42.845	1 7 36.090	-72 46 42.600	17.235	17.746	16.635	0.509	0.599	0.090	8.2	1
SMC194	6	sc5	27897	16254	1.4	0 49 5.082	-73 21 3.517	0 49 5.290	-73 21 3.400	16.948	18.373	15.510	1.419	1.437	0.070	7.9	1

**Table C.8.** Table 2 of other kind of emission line stars (not Main Sequence stars): same as for table C.2. Note that for these stars, the classification (for main sequence stars) is less reliable than in other previous tables

Cluster	Image	ID	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
	WFI	WFI							
SMC008	2	32681	0.561	17.630	-1.120	0.674	G0-2III-II:		
SMC008	2	33371	1.552	17.852	-0.898	2.163	M3III:		
SMC008	2	32765	0.786	18.154	-0.596	0.941	G5III		
SMC008	2	33200	-0.745	20.158	1.408	0.176	A2	[MA93] 11	Em*
SMC015	1	9969	1.492	16.334	-2.416	1.347	M2III-II:		
SMC015	1	9516	1.297	16.936	-1.814	1.690	K9III		
SMC015	1	48053	0.487	20.652	1.902	-0.001	F5III:		
SMC39	4	18580	0.112	14.649	-4.101	0.376	B5II:	2MASS J00471042-7328180	star
SMC39	4	18288	0.284	16.823	-1.927	0.529	F1II:		
SMC39	4	17311	1.352	16.516	-2.234	1.312	M1III-II:		
SMC39	4	18196	0.758	17.142	-1.608	0.864	G5III-II:		
SMC43	4	46790	0.131	16.237	-2.513	0.396	A7II:	[MA93] 193	Em*
SMC47	5	25512	0.519	19.003	0.253	0.778	A9III:		
SMC49	6	18987	1.219	17.402	-1.348	1.191	B3-B4		
SMC49	6	20941	0.697	17.424	-1.326	0.794	G5III-II:		
SMC49	6	19536	-1.079	20.888	2.138	0.399	A5-A6		
SMC54	6	26281	0.195	16.201	-2.549	0.313	A8II:		
SMC54	6	25893	1.234	17.801	-0.949	0.976	K5III		
SMC61	6	40871	1.150	17.196	-1.554	1.203	K5III		
SMC61	6	40887	-0.326	18.503	-0.247	-0.560	B8		
SMC61	6	40536	0.695	19.074	0.324	0.734	F1III:		
SMC64	5	31529	2.203	17.138	-1.612	1.351	MIII:		
SMC67	5	56955	1.108	17.345	-1.405	1.135	K5III		
SMC67	5	57052	0.554	17.895	-0.855	0.753	G0-2III-II:		
SMC68	6	37450	1.356	17.064	-1.686	1.347	K9III		
SMC68	6	39689	0.099	17.951	-0.799	-0.608	B9III-II:		
SMC68	6	37302	1.079	17.936	-0.814	1.058	K2III		
SMC68	6	36375	0.775	18.364	-0.386	0.900	G5III		
SMC68	8	12982	-0.685	20.448	1.698	0.921	A3-A4	ISO-MCMS J005041.5-731739	Em*
SMC69	5	6154	0.876	16.581	-2.169	1.112	G3II:		
SMC69	5	5453	0.844	18.347	-0.403	1.071	G5III		
SMC69	5	5851	0.898	19.207	0.457	0.917	G3III:		

Table C.8. Other emission-line star table 2, continued

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC70	6	39108	0.634	19.357	0.607	0.851	F1III:		
SMC71	5	26433	-0.098	15.698	-3.052	0.566	B9III-II:		
SMC72	6	47906	-0.081	15.865	-2.885	0.277	B8III:	[WSH2003] d-129 ?	IR
SMC72	6	47440	0.481	18.598	-0.152	0.683	A8III:		
SMC73	5	47237	0.837	17.680	-1.070	0.916	G8III-II:		
SMC74	5	33275	0.618	16.281	-2.469	0.483	F9II:	2MASS J00515560-7257534	IR, Cepheid
SMC74	5	34888	1.259	16.974	-1.776	1.220	K9III		
SMC76	7	50781	0.737	16.336	-2.414	1.076	G0II:	2MASS J00521076-7231342	Em*
SMC82	7	5632	0.989	17.792	-0.958	1.081	K0III:		
SMC82	7	7335	0.819	18.492	-0.258	0.950	G5III		
SMC89	7	40128	0.748	19.398	0.648	1.210	F5III:		
SMC89	7	40967	0.151	20.221	1.471	1.657	A5IV:	2MASS J00525211-7238206	Em*
SMC90	8	5703	0.579	17.956	-0.794	0.750	G0-2III-II:		
SMC90	8	4344	0.585	18.025	-0.725	0.680	G0-2III-II:		
SMC98	8	27738	0.910	17.177	-1.573	1.025	K2III-II		
SMC98	8	28402	1.020	17.249	-1.501	1.072	K3III-II:		
SMC98	8	28567	0.939	17.596	-1.154	0.993	K0III:		
SMC98	8	29408	0.932	18.408	-0.342	0.972	G8III		
SMC99	7	59064	1.621	16.679	-2.071	1.350	M3III-II:		
SMC99	7	59097	0.966	17.824	-0.926	0.981	K0III:		
SMC99	7	57172	1.459	19.013	0.263	1.467	K9III		
SMC104	7	23453	0.020	20.372	1.622	5.168	A3-A4V		
SMC105	7	17563	1.504	16.664	-2.086	1.495	M2III-II:		
SMC105	7	18620	1.511	16.640	-2.110	1.409	M2III-II:		
SMC105	7	17400	0.842	18.139	-0.611	1.262	G5III		
SMC107	9	37803	0.890	14.229	-4.521	1.188	K4I	[MFH2007] SMC5-2807	Sge, EB
SMC107	9	37219	0.421	16.961	-1.789	0.708	F5II:	Cl* NGC 330 KWBBE 485	IR, HB[e], AGB
SMC107	9	39390	-	16.926	-1.824	-0.051	B2	Cl* NGC 330 KWBBE 1845	*iC
SMC107	9	40364	1.004	17.107	-1.643	-0.773	K3III-II:	Cl* NGC 330 KWBBE 4154	PN
SMC107	9	38179	-0.453	17.764	-0.986	-0.284	B5-B6	Cl* NGC 330 KWBBE 458	*iC
SMC107	9	38481	-0.994	17.596	-1.154	-0.095	B5-B6	Cl* NGC 330 KWBBE 453	*iC
SMC107	9	38214	-	19.470	0.720	0.127	A0	Cl* NGC 330 ROB A32	*iC
SMC107	9	38775	0.205	20.344	1.594	0.333	A4IV:	Cl* NGC 330 ROB B21	B1/B2II/IIIe
SMC109	9	61352	-0.024	17.413	-1.337	0.385	B3-B4		
SMC109	9	61387	-	18.513	-0.237	-0.474	B8		
SMC109	9	61314	-0.527	19.161	0.411	0.405	B9		

**Table C.8.** Other emission-line star table 2, continued

Cluster	Image WFI	ID WFI	(B-V) <sub>0</sub>	V <sub>0</sub>	M <sub>v</sub>	(V-I) <sub>0</sub>	ST	ID Simbad	ST Simbad
SMC117	9	25911	1.029	17.101	-1.649	1.026	K3III-II:		
SMC117	9	27255	1.341	16.711	-2.039	1.213	M1III-II:		
SMC117	9	27276	1.216	17.192	-1.558	1.179	K5III		
SMC117	9	27278	-	19.769	1.019	0.298	A1		
SMC120	9	52998	-	18.102	-0.648	1.165	B5-B6		
SMC121	11	3908	1.214	17.392	-1.358	1.214	K5III		
SMC121	11	3672	1.214	17.514	-1.236	1.218	K5III		
SMC121	11	2725	0.943	17.741	-1.009	1.230	K0III:		
SMC124	9	53362	1.506	16.974	-1.776	1.368	M2III-II:		
SMC124	9	53549	1.789	18.439	-0.311	0.978	MIII:		
SMC129	12	44327	1.120	17.163	-1.587	1.127	K5III		
SMC129	12	43061	0.284	18.484	-0.266	1.091	A0III:		
SMC139	12	17345	0.094	19.238	0.488	0.289	A3III		
SMC139	12	18035	-	19.365	0.615	0.402	A0		
SMC141	12	41542	0.375	15.009	-3.741	0.541	A9II:		
SMC142	11	34225	-0.207	17.053	-1.697	-0.430	B2	[MA93] 1471	Em*
SMC145	13	34943	-	19.908	1.158	1.130	A1	[FBR2002] J010505-715936 ?	Rad
SMC149	13	32199	0.482	16.159	-2.591	0.616	F3II:	OGLE SMC-SC10 108122	Cepheid?
SMC149	13	31744	0.525	16.001	-2.749	0.655	F5II:		
SMC156	14	12631	0.353	15.468	-3.282	0.531	F0II:		
SMC156	14	11524	0.419	16.956	-1.794	0.469	F5II:		
SMC194	6	27897	1.349	16.731	-2.019	1.336	M1III-II:		

**Table C.9.** emission-line star from WFI without identification in SC catalogues from Ogle (Udalski et al. 1998). The status indicates whether the star is found as a definite emission-line star (ELS) or a candidate emission-line star (ELS?)

Cluster	Image WFI	ID WFI	RA(2000) WFI	DEC(2000) WFI	E[B-V]	log(t)	status	ID Simbad	ST Simbad
SMC12	1	45403	0 41 24.034	-72 53 54.477	0.06	9	ELS?		
SMC12	1	46376	0 41 18.777	-72 53 8.976	0.06	9	ELS?		
SMC47	5	27197	0 48 34.021	-72 58 35.742	0.12	7.8	ELS		
SMC49	6	21247	0 48 40.269	-73 24 8.730	0.06	7	ELS?		
SMC64	5	31661	0 50 39.163	-72 57 51.239	0.1	8.1	ELS	OGLE J005039.05-725751.4	Be?
SMC78	8	49392	0 52 16.683	-73 1 24.842	0.08	7.9	ELS	LIN 202	Em*
SMC81	7	36209	0 52 37.860	-72 40 49.885	0.12	7.4	ELS?		
SMC82	7	61803	0 52 39.276	-72 55 29.603	0.12	7.4	ELS		
SMC83	8	54326	0 52 41.180	-72 59 19.144	0.09	7.8	ELS		
SMC83	8	55937	0 52 47.000	-72 58 32.314	0.09	7.8	ELS		
SMC89	7	39236	0 53 11.104	-72 39 34.315	0.09	7.3	ELS	2dFS 5064	Em*
SMC89	7	39526	0 52 59.533	-72 39 16.040	0.09	7.3	ELS	LIN 226	Em*
SMC89	7	39545	0 53 19.997	-72 39 30.179	0.09	7.3	ELS		
SMC89	7	39828	0 52 56.260	-72 39 4.350	0.09	7.3	ELS		
SMC89	7	42020	0 53 22.264	-72 38 7.245	0.09	7.3	ELS	[MA93] 666	Em*
SMC89	7	42367	0 53 5.564	-72 37 40.918	0.09	7.3	ELS		
SMC89	7	42626	0 53 34.325	-72 37 52.327	0.09	7.3	ELS	[MA93] 685	Em*
SMC89	7	42727	0 52 58.857	-72 37 22.725	0.09	7.3	ELS	2MASS J00525899-7237226	Em*
SMC89	7	44110	0 52 38.895	-72 36 19.773	0.09	7.3	ELS	2MASS J00523904-7236198	Em*
SMC89	7	39179	0 53 4.863	-72 39 31.443	0.09	7.3	ELS?		
SMC89	7	40377	0 52 44.290	-72 38 35.552	0.09	7.3	ELS?		
SMC89	7	40732	0 53 24.642	-72 38 52.211	0.09	7.3	ELS?		
SMC89	7	41098	0 52 47.476	-72 38 18.479	0.09	7.3	ELS?	[MA93] 604	Em*
SMC89	7	41948	0 52 58.205	-72 37 50.734	0.09	7.3	ELS?		
SMC89	7	42509	0 53 7.017	-72 37 37.569	0.09	7.3	ELS?		
SMC89	7	44408	0 53 5.257	-72 36 26.778	0.09	7.3	ELS?		
SMC92	7	27577	0 53 19.087	-72 46 2.259	0.12	7.4	ELS?	2MASS J00531922-7246019	Em*
SMC107	9	38884	0 56 15.777	-72 27 58.477	0.1	7.5	ELS	Cl* NGC 330 ROB A12	Be*
SMC107	9	39126	0 56 27.281	-72 27 41.167	0.1	7.5	ELS	Cl* NGC 330 KWBBE 1830	*iC
SMC107	9	39781	0 56 17.936	-72 27 13.754	0.1	7.5	ELS	[MFH2007] SMC5-14727	B2IVe
SMC126	12	22678	1 0 56.081	-72 44 54.142	0.07	8	ELS		
SMC128	11	9857	1 1 28.530	-72 24 29.437	0.09	7.1	ELS		
SMC128	11	10054	1 1 35.187	-72 24 27.118	0.09	7.1	ELS?		
SMC134	11	23759	1 3 10.322	-72 16 19.565	0.05	7.8	ELS?		
SMC137	12	35467	1 3 22.062	-72 39 41.917	0.06	7.6	ELS		
SMC137	12	36127	1 3 30.300	-72 39 24.713	0.06	7.6	ELS		
SMC137	12	37019	1 3 30.051	-72 38 54.070	0.06	7.6	ELS?		
SMC139	12	17319	1 3 51.369	-72 49 39.385	0.07	7.5	ELS		
SMC139	12	17598	1 3 52.447	-72 49 31.960	0.07	7.5	ELS	[MA93] 1420 ?	Em*
SMC139	12	17417	1 3 55.757	-72 49 39.585	0.07	7.5	ELS?		
SMC140	12	37541	1 4 18.979	-72 39 10.941	0.09	7.2	ELS	[MA93] 1456	Em*
SMC142	11	33354	1 4 38.296	-72 10 11.999	0.06	7.3	ELS		
SMC142	11	33470	1 4 28.547	-72 10 0.257	0.06	7.3	ELS		
SMC142	11	33596	1 4 27.137	-72 9 54.350	0.06	7.3	ELS	[MA93] 1462	Em*
SMC153	13	16305	1 6 52.020	-72 16 39.709	0.04	7.2	ELS		
SMC153	13	16434	1 6 46.229	-72 16 29.729	0.04	7.2	ELS		
SMC153	13	16267	1 6 44.544	-72 16 36.636	0.04	7.2	ELS?	[M2002] SMC 64573	star
SMC160	13	4716	1 8 37.597	-72 26 21.269	0.04	7.6	ELS?		
SMC160	14	34767	1 8 34.857	-72 26 11.936	0.04	7.6	ELS?		

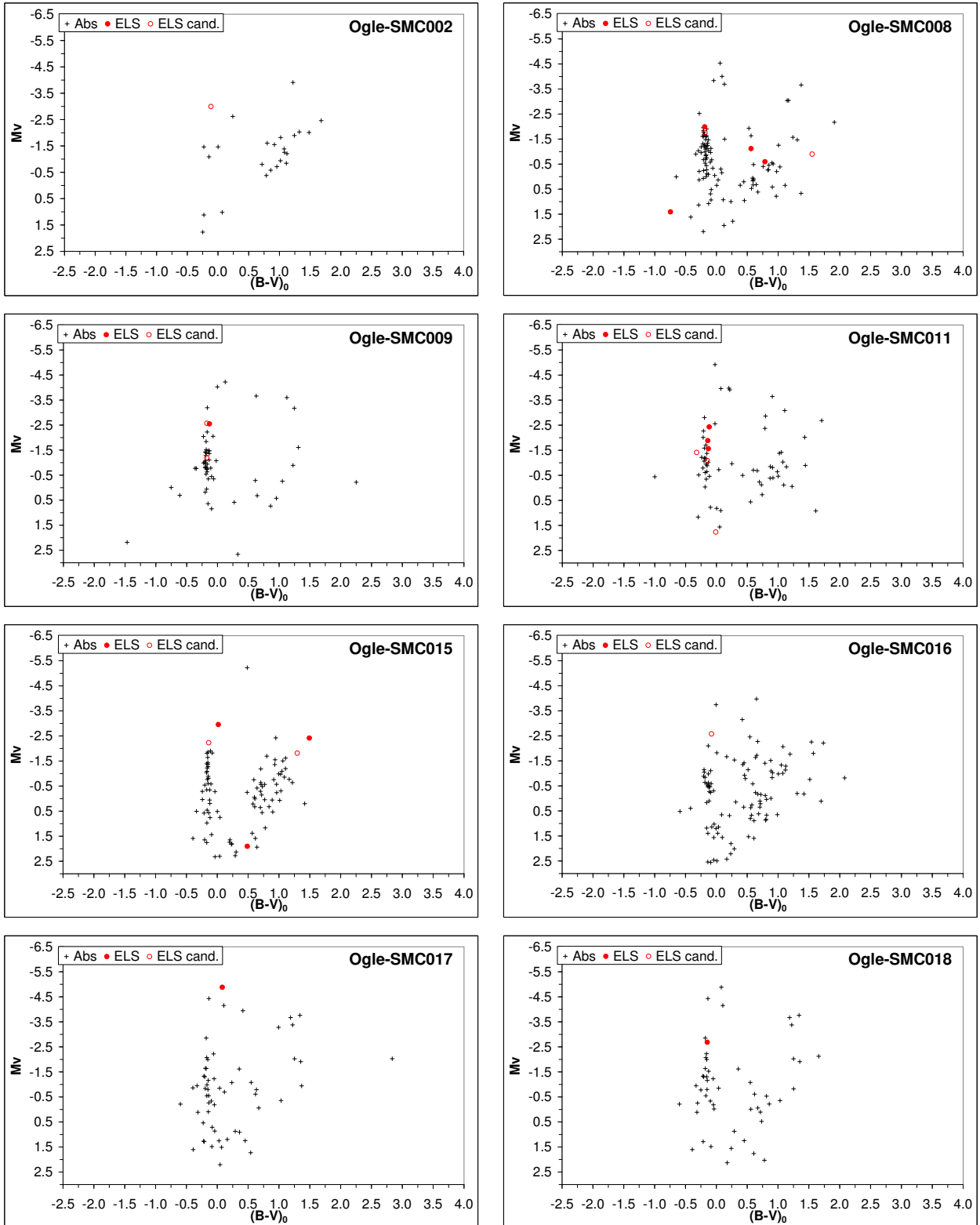


## Appendix D: HR diagrammes for individual open clusters

Colour/magnitude ( $M_v$ ,  $(B-V)_0$ ) diagrammes are presented separately for each open cluster in the SMC with at least 10 members and at least 1 WFI emission-line star with OGLE photometry Udalski et al. (1998)

### List of Objects

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**Fig. D.1.** Dereddened colour  $(B-V)_0$ , absolute magnitude  $M_v$  diagrams for open clusters in the SMC with at least 10 stars and at least 1 emission-line star (red filled circle) or candidate emission-line star (red opened circle). Normal stars appear as black '+'. The identification of each open cluster is given in the right-top corner.

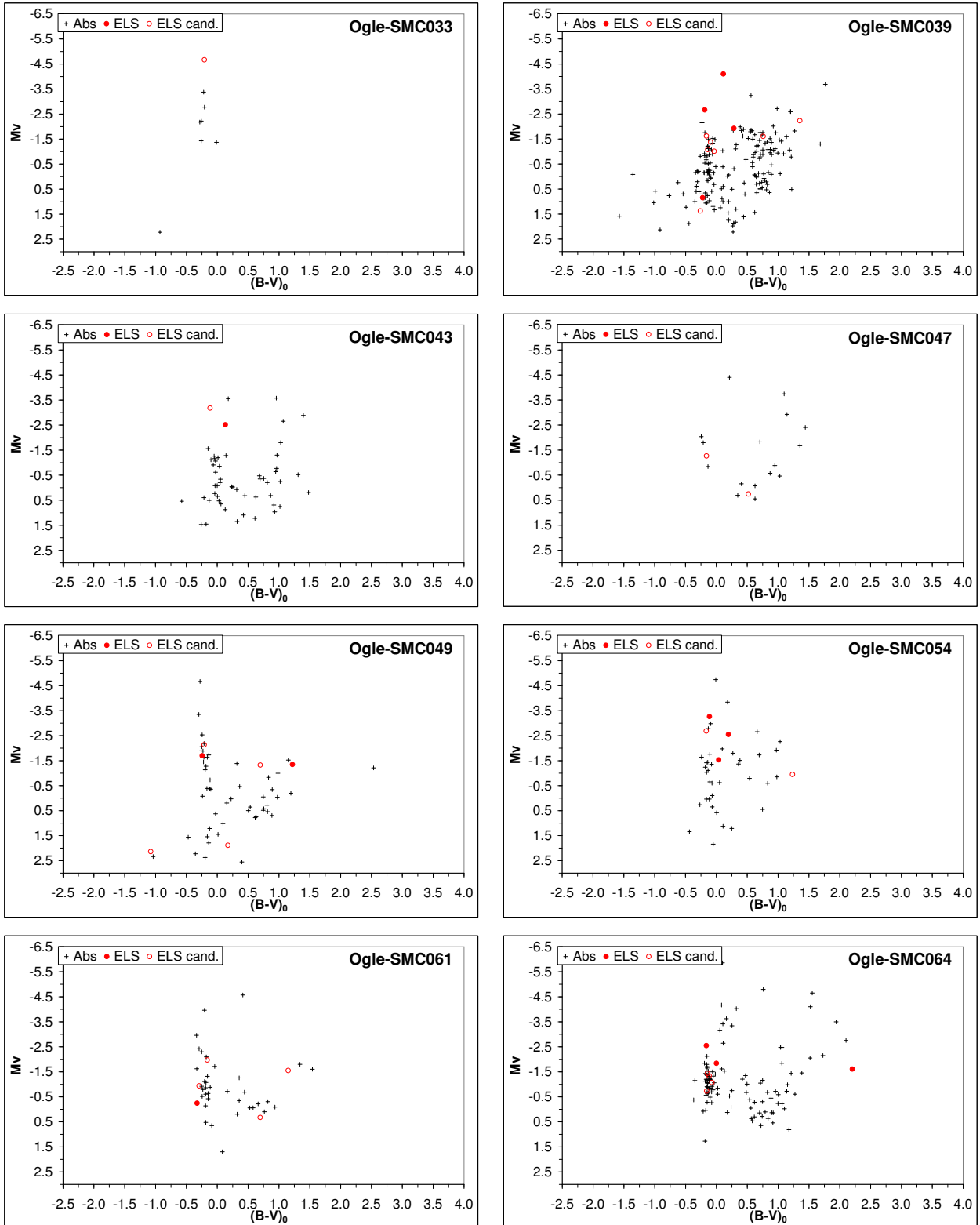


Fig. D.2. Same caption as for fig. D.1

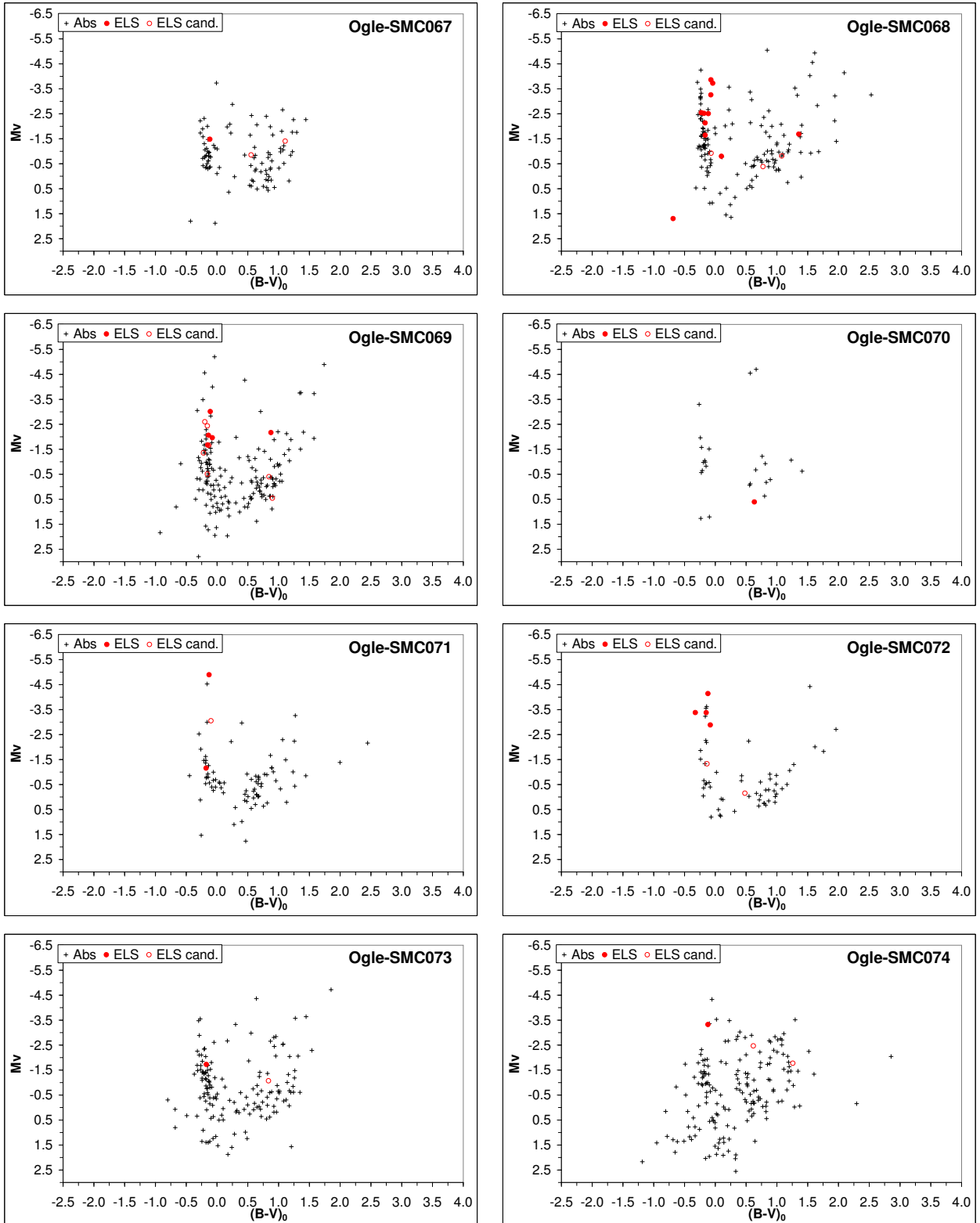


Fig. D.3. Same caption as for fig. D.1

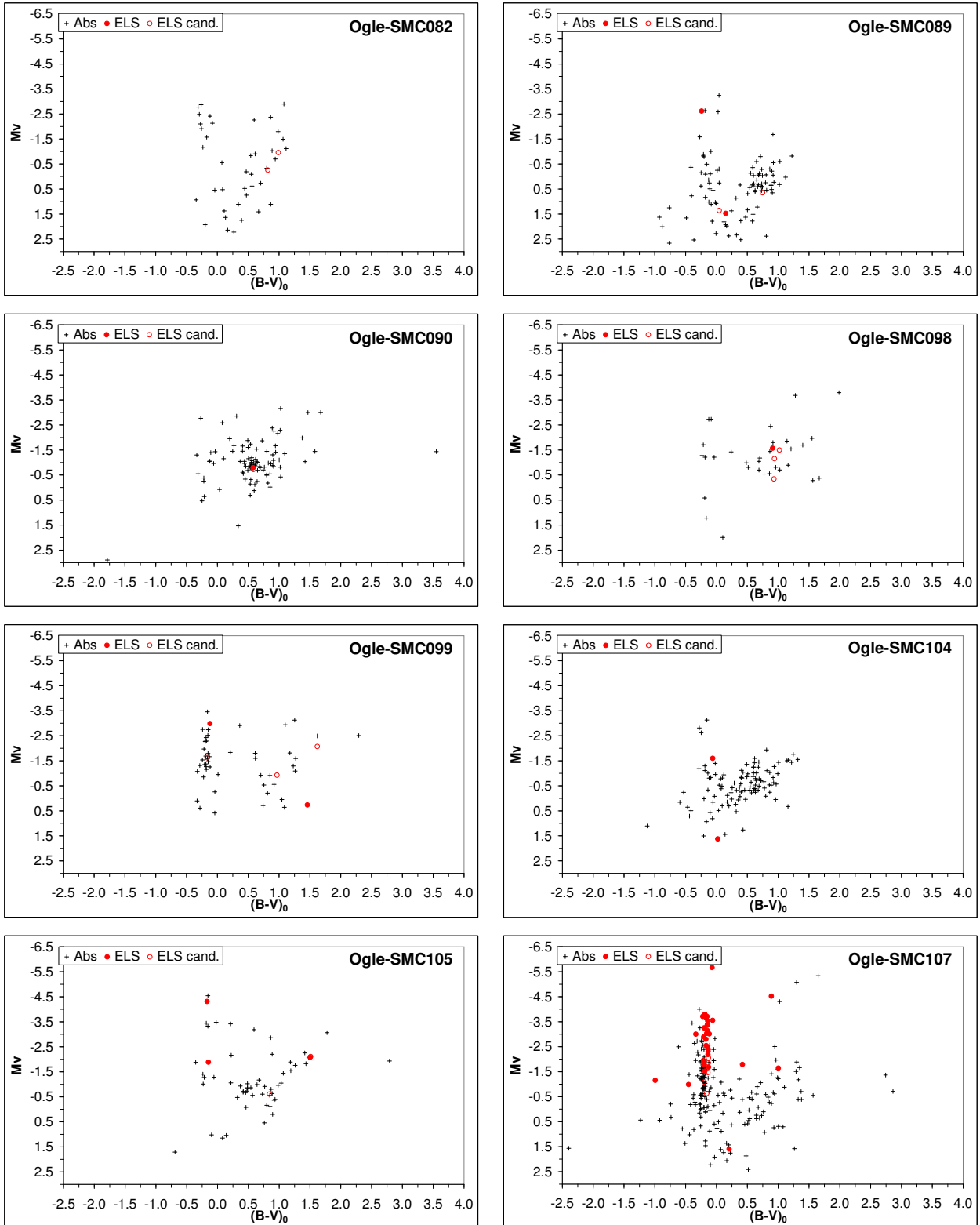


Fig. D.4. Same caption as for fig. D.1

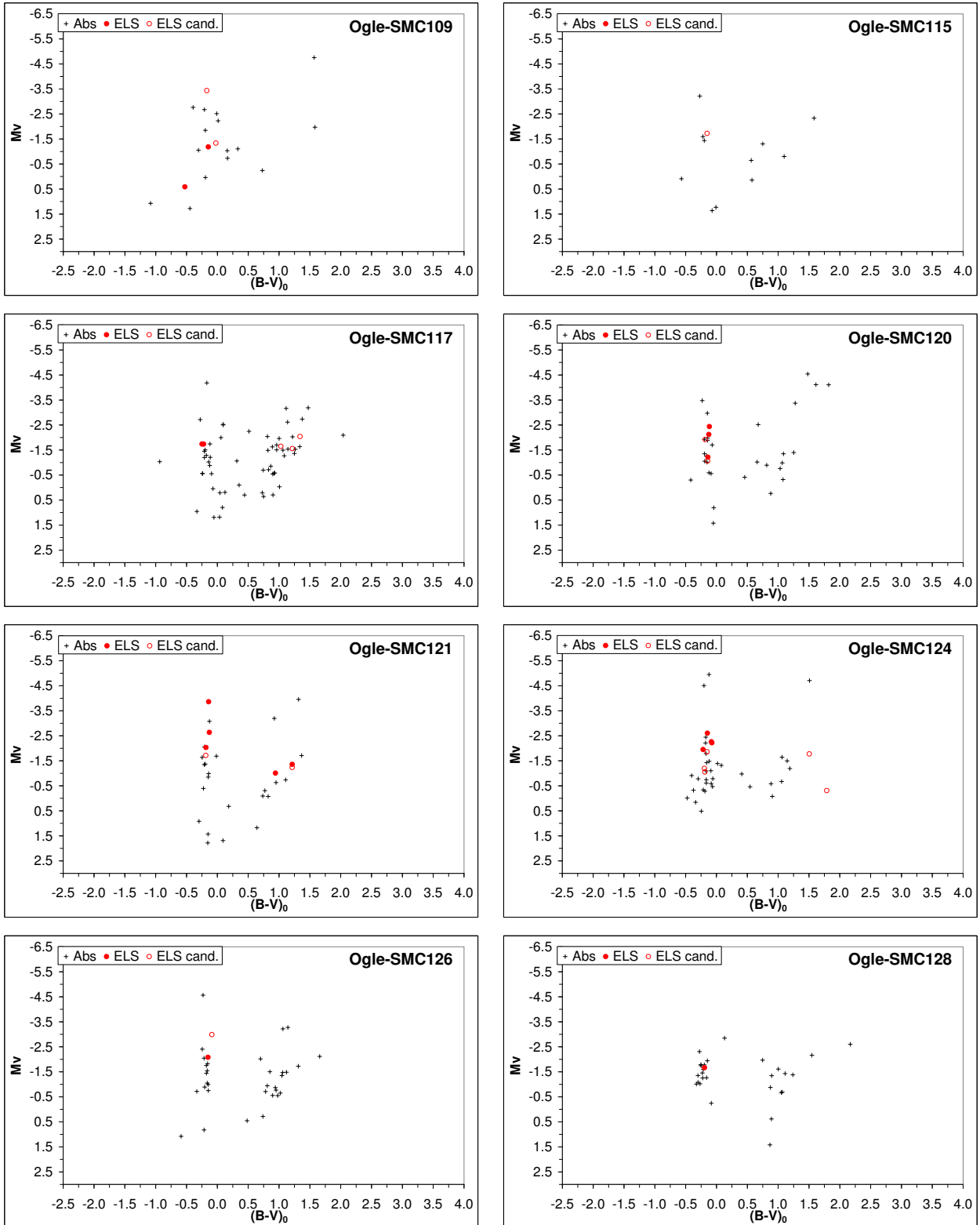


Fig. D.5. Same caption as for fig. D.1

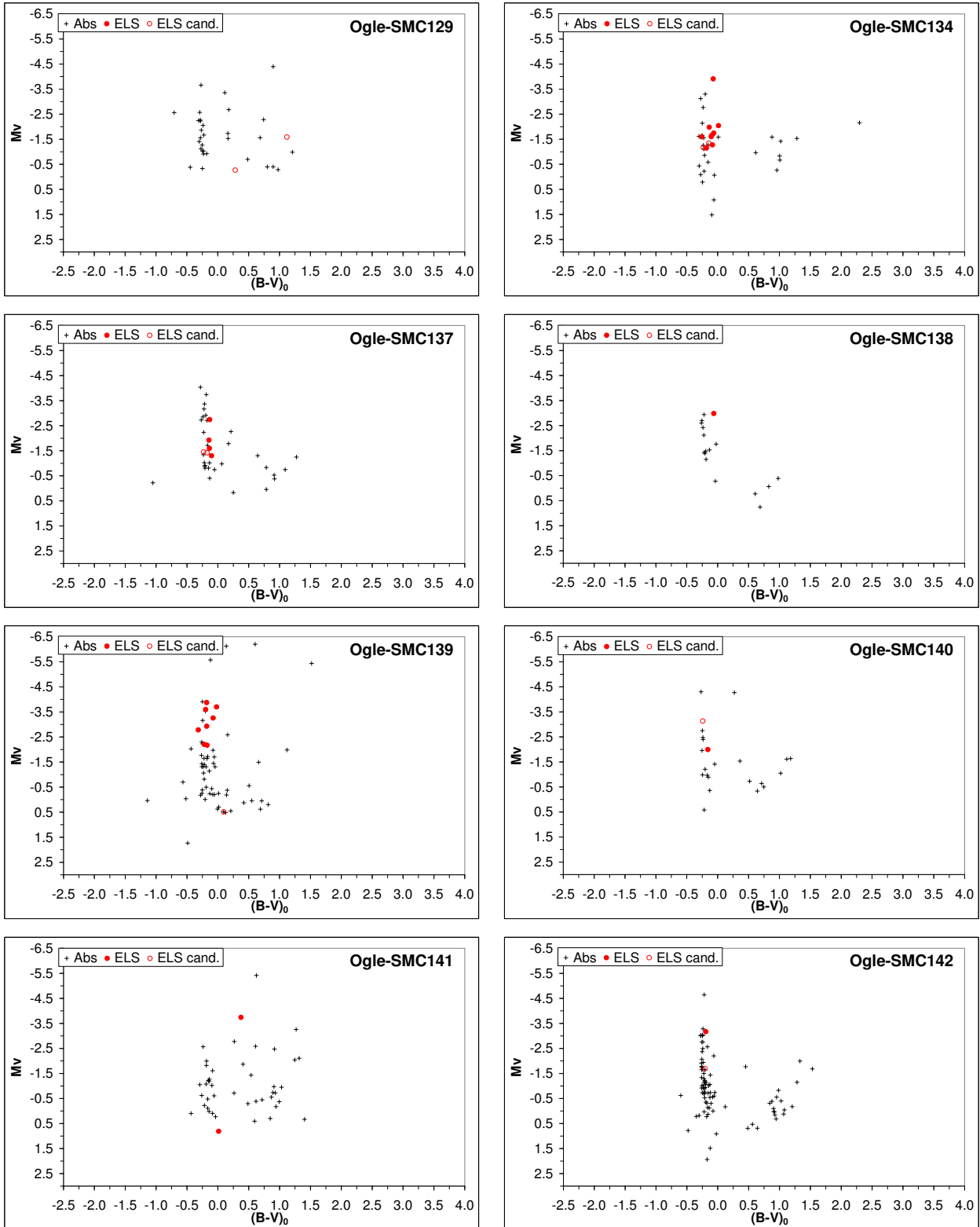


Fig. D.6. Same caption as for fig. D.1

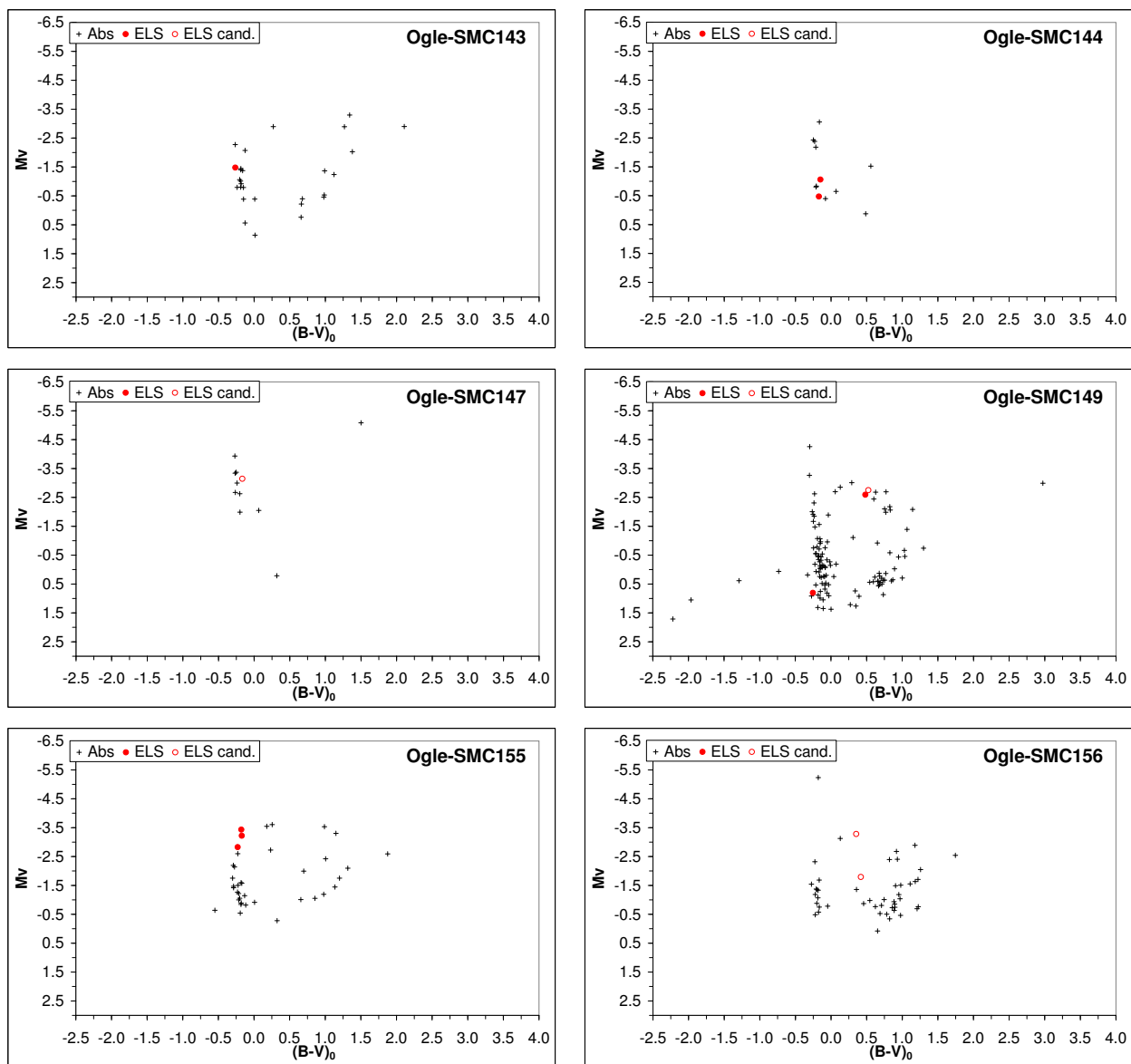


Fig. D.7. Same caption as for fig. D.1



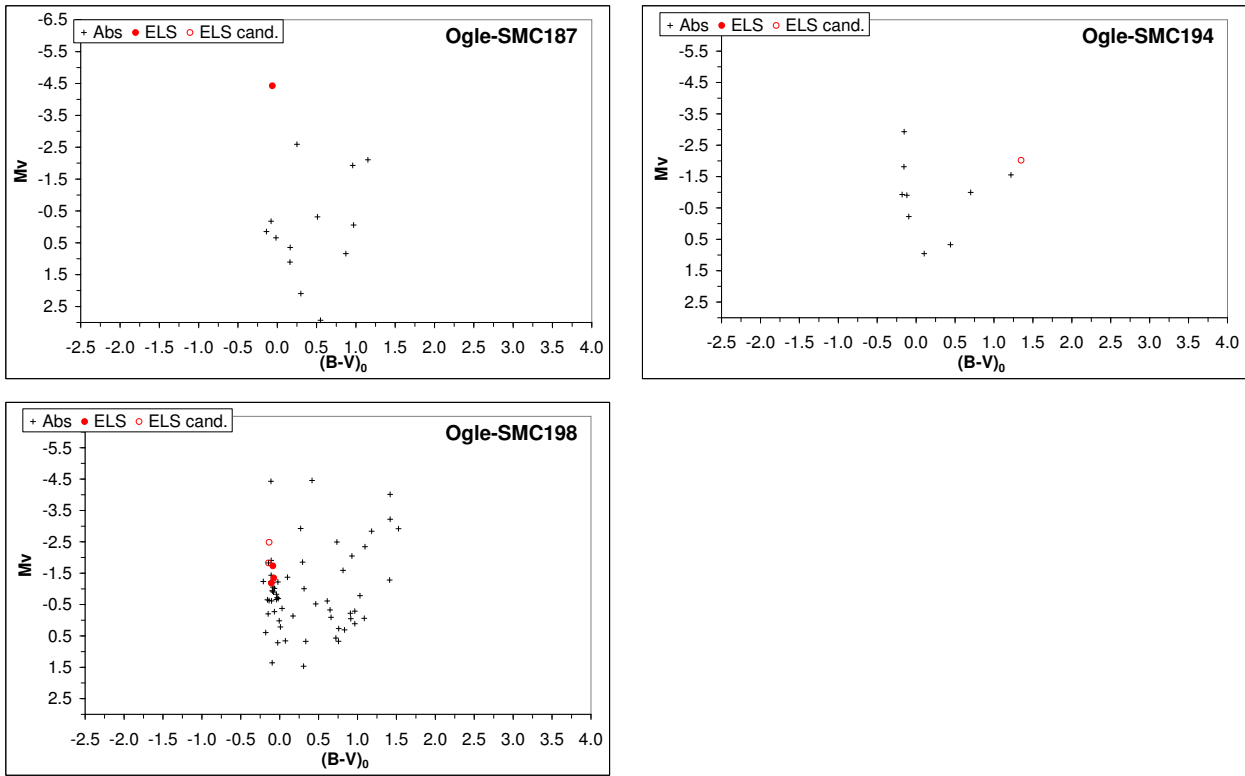


Fig. D.8. Same caption as for fig. D.1