J/A+A/601/A70 GES: pre-main-sequence clusters [Fe/H] (Spina+, 2017)

The Gaia-ESO Survey: the present-day radial metallicity distribution of the Galactic disc probed by pre-main-sequence clusters.

Spina L., Randich S., Magrini L., Jeffries R.D., Friel E.D., Sacco G.G., Pancino E., Bonito R., Bravi L., Franciosini E., Klutsch A., Montes D., Gilmore G., Vallenari A., Bensby T., Bragaglia A., Flaccomio E., Koposov S.E., Korn A.J., Lanzafame A.C., Smiljanic R., Bayo A., Carraro G., Casey A.R., Costado M.T., Damiani F., Donati P., Frasca A., Hourihane A., Jofre P., Lewis J., Lind K., Monaco L., Morbidelli L., Prisinzano L., Sousa S.G., Worley C.C., Zaggia S.

<Astron. Astrophys. 601, A70 (2017)>
=2017A&A...601A..70S (SIMBAD/NED BibCode)

ADC_Keywords: Milky Way ; Clusters, open ; Effective temperatures ; Abundances

Keywords: stars: abundances - stars: pre-main sequence - Galaxy: abundances - Galaxy: disc - Galaxy: evolution - open clusters and associations: general

Abstract:

The radial metallicity distribution in the Galactic thin disc represents a crucial constraint for modelling disc formation and evolution. Open clusters allow us to derive both the radial metallicity distribution and its evolution over time. In this paper we perform the first investigation of the present-day radial metallicity distribution based on [Fe/H] determinations in late type members of pre-main-sequence clusters. Because of their youth, these clusters are therefore essential for tracing the current inter-stellar medium metallicity. We used the products of the Gaia-ESO Survey analysis of 12 young regions (age<100Myr), covering Galactocentric distances from 6.67 to 8.70kpc. For the first time, we derived the metal content of star forming regions farther than 500pc from the Sun. Median metallicities were determined through samples of reliable cluster members. For ten clusters the membership analysis is discussed in the present paper, while for other two clusters (Chamaeleon I and Gamma Velorum) we adopted the members identified in our previous works. All the pre-main-sequence clusters considered in this paper have close-to-solar or slightly sub-solar metallicities. The radial metallicity distribution traced by these clusters is almost flat, with the innermost star forming regions having [Fe/H] values that are 0.10-0.15dex lower than the majority of the older clusters located at similar Galactocentric radii. This homogeneous study of the present-day radial metallicity distribution in the Galactic thin disc favours models that predict a flattening of the radial gradient over time. On the other hand, the decrease of the average [Fe/H] at young ages is not easily explained by the models. Our results reveal a complex interplay of several processes (e.g. star formation activity, initial mass function, supernova yields, gas flows) that controlled the recent evolution of the Milky Way.

Description:

Stellar parameters, equivalent widths of the lithium line at 6707.8Å and gamma indexes of the cluster members. Values from the Gaia-ESO Survey iDR4 catalogue.

File Summary:

FileName	Lrecl	Records	Explanations

ReadMe	80	.	This file
table1.dat	110	536	Stellar parameters, EWs of the lithium line at 6707.8Å and gamma indexes of cluster members

See also:

I/337 : Gaia DR1 (Gaia Collaboration, 2016)
J/A+A/567/A55 : Metallicity of the γ Vel cluster (Spina+, 2014)
J/A+A/569/A17 : Gaia-ESO Survey: NGC6705 (Cantat-Gaudin+, 2014)
J/A+A/572/A33 : Abundances from Gaia-ESO Survey (Mikolaitis+, 2014)
J/A+A/573/A55 : Gaia-ESO Survey: Tr 20, NGC4815, NGC6705 (Tautvaisiene+, 2015)
J/A+A/575/A4 : Activity and accretion in γ Vel and Cha I (Frasca+, 2015)
J/A+A/598/A5 : Gaia-ESO Survey iDR4 calibrators (Pancino+, 2017)

Byte-by-byte Description of file: table1.dat

Bytes	Format	Units	Label	Explanations
1- 16	A16	---	CName	Object name (HHMMSSss+DDMMSSs)
18- 19	I2	h	RAh	Right ascension (J2000.0)
21- 22	I2	min	RAm	Right ascension (J2000.0)
24- 28	F5.2	s	RAs	Right ascension (J2000.0)
30	A1	---	DE-	Declination sign (J2000.0)
31- 32	I2	deg	DEd	Declination (J2000.0)
34- 35	I2	arcmin	DEm	Declination (J2000.0)
37- 40	F4.1	arcsec	DEs	Declination (J2000.0)
42- 49	A8	---	Cluster	Cluster name (1)
51- 55	A5	---	Grating	Instrument grating (HR15N or U580)
57- 60	I4	K	Teff	Effective temperature
62- 64	I3	K	e_Teff	Error on Teff
66- 69	F4.2	[cm/s2]	logg	? Surface gravity
71- 74	F4.2	[cm/s2]	e_logg	? Error on logg
76- 80	F5.2	[-]	[Fe/H]	Iron abundance
82- 85	F4.2	[-]	e_[Fe/H]	Error on [Fe/H]
87- 91	F5.1	0.1pm	EW(Li)	Equivalent width of the lithium line at 6707.8Å
93- 96	F4.1	0.1pm	e_EW(Li)	Error on EW(Li)
98-103	F6.4	---	gamma	? gamma index
105-110	F6.4	---	e_gamma	? Error on gamma

Note (1): Studied clusters:
Carina, IC2391, IC2602, IC4665, NGC2264, NGC2451A, NGC2451B, NGC2547, NGC6530 and RhoOph

Acknowledgements:
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(End) Patricia Vannier [CDS] 23-Feb-2017

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