J/A+A/616/A12 Gaia DR2 sources in GC and dSph (Gaia Collaboration+, 2018)

Gaia Data Release 2. Kinematics of globular clusters and dwarf galaxies around the Milky Way

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Abstract:

The goal of this paper is to demonstrate the outstanding quality of the second data release of the Gaia mission and its power for constraining many different aspects of the dynamics of the satellites of the Milky Way. We focus here on determining the proper motions of 75 Galactic globular clusters, nine dwarf spheroidal galaxies, one ultra-faint system, and the Large and Small Magellanic Clouds. Using data extracted from the Gaia archive, we derived the proper motions and parallaxes for these systems, as well as their uncertainties. We demonstrate that the errors, statistical and systematic, are relatively well understood. We integrated the orbits of these objects in three different Galactic potentials, and characterised their properties. We present the derived proper motions, space velocities, and characteristic orbital parameters in various tables to facilitate their use by the astronomical community. Our limited and straightforward analyses have allowed us for example to (i) determine absolute and very precise proper motions for globular clusters; (ii) detect clear rotation signatures in the proper motions of at least five globular clusters; (iii) show that the satellites of the Milky Way are all on high-inclination orbits, but that they do not share a single plane of motion; (iv) derive a lower limit for the mass of the Milky Way of $9.8^{+6.7}_{-2.7}\times10^{11}M_{\odot}$ based on the assumption that the Leo~I dwarf spheroidal is bound; (v) derive a rotation curve for the Large Magellanic Cloud based solely on proper motions that is competitive with line-of-sight velocity curves, now using many orders of magnitude more sources; and (vi) unveil the dynamical effect of the bar on the motions of stars in the Large Magellanic Cloud. All these results highlight the incredible power of the Gaia astrometric mission, and in particular of its second data release.

Description:

The files contains lists of possible members of each of the objects (75 globular clusters, 9 dwarf spheroidal galaxies, the Bootes I UFD, the LMC and SMC). The stars in these lists have been selected and used to determine the astrometric parameters of the corresponding objects following either the procedures described in Sec. 2.1 (for the clusters and dwarfs) or in Sec. 2.2 (for the LMC and SMC). The first column is the "source_id" as given by Gaia, the ra and declination of

the star in degrees, and its G-band magnitude (known as "phot$_g$mean_mag" in the Gaia archive).

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
list.dat	52	87	List of group (clusters, galaxies and ultra-faint system)
tabled3.dat	96	10010064	table

See also:
I/345 : Gaia DR2 (Gaia Collaboration, 2018)

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

Bytes	Format	Units	Label	Explanations
1- 22	A22	---	Name	Group name
26- 43	A18	---	FileName	Name of the files with data in subdirectory files
46- 52	I7	---	N	Number of Gaia DR2 source in the associated file

Byte-by-byte Description of file: tabled3.dat

Bytes	Format	Units	Label	Explanations
1- 23	A23	--	Name	Group name
24- 42	I19	--	Source	Gaia DR2 source identifier (source_id)
44- 66	F23.19	deg	RAICRS	Gaia DR2 right ascension (ICRS, Ep=2015.5)
68- 86	F19.15	deg	DEICRS	Gaia DR2 declination (ICRS, Ep=2015.5)
88- 96	F9.6	mag	Gmag	Gaia DR2 G-band mean magnitude (Vega)

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Amina Helmi, ahelmi(at)astro.rug.nl

(End) Patricia Vannier [CDS] 24-Apr-2018

*The document above follows the rules of the Standard Description for Astronomical Catalogues; from this documentation it is possible to generate **f77** program to load files into arrays or line by line*