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J/ApJ/790/164Candidate bulge WDs in the SWEEPS field(Calamida+, 2014)

First detection of the white dwarf cooling sequence of the Galactic bulge.
Calamida A., Sahu K.C., Anderson J., Casertano S., Cassisi S., Salaris M.,
Brown T., Sokol J., Bond H.E., Ferraro I., Ferguson H., Livio M.,
Valenti J., Buonanno R., Clarkson W., Pietrinferni A.
<Astrophys. J., 790, 164 (2014)>
=2014ApJ...790..164C(SIMBAD/NED BibCode)

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Proper motions
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Abstract:

We present Hubble Space Telescope data of the low-reddening Sagittarius window in the Galactic bulge. The Sagittarius Window Eclipsing Extrasolar Planet Search field (~3'x3'), together with three more Advanced Camera for Surveys and eight Wide-Field Camera 3 fields, were observed in the F606W and F814W filters, approximately every two weeks for 2 yr, with the principal aim of detecting a hidden population of isolated black holes and neutron stars through astrometric microlensing. Proper motions were measured with an accuracy of ~0.1 mas/yr (~4 km/s) at F606W ~25.5 mag, and better than ~0.5 mas/yr (~20 km/s) at F606W ~28 mag, in both axes. Proper-motion measurements allowed us to separate disk and bulge stars and obtain a clean bulge color-magnitude diagram. We then identified for the first time a white dwarf (WD) cooling sequence in the Galactic bulge, together with a dozen candidate extreme horizontal branch stars. The comparison between theory and observations shows that a substantial fraction of the WDs (~30%) are systematically redder than the cooling tracks for CO-core H-rich and He-rich envelope WDs. This evidence would suggest the presence of a significant number of low-mass WDs and WD-main-sequence binaries in the bulge. This hypothesis is further supported by the finding of two dwarf novae in outburst, two short-period ($P \leq 1$ day) ellipsoidal variables, and a few candidate cataclysmic variables in the same field.

Description:

We observed the Sagittarius Window Eclipsing Extrasolar Planet Search (SWEEPS) field (l=0°, b=-2.65°) in the Galactic bulge in 2004 and again in 2011, 2012, and 2013 with the Hubble Space Telescope (HST), using the Wide-Field Channel of the Advanced Camera for Survey (ACS; proposals GO-9750, GO-12586, PI: Sahu). The SWEEPS field covers ~3.3'x3.3' in a region of relatively low extinction in the bulge (E(B-V)≤0.6 mag; Oosterhoff & Ponsen, 1968BANS....3...79Q). The 2004 observations were taken in the F606W (wide V) and F814W (wide I) filters over the course of one week (for more details, see Sahu et al. 2006Natur.443..534S). The new data were collected between 2011 October and 2013 October, with a ~2 week cadence, for a total of 60 F606W- and 61 F814W-band images.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
table1.dat	53	74	List of the Candidate Bulge WDs in the SWEEPS Field

See also:

J/A+A/549/A147 : Abundances of microlensed bulge dwarf stars. V.
(Bensby+, 2013)

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

Bytes	Format	Units	Label	Explanations
1- 2	I2	---	ID	Candidate bulge WD identifier (1)
4- 5	I2	h	RAh	Hour of Right Ascension (J2000)
7- 8	I2	min	RAm	Minute of Right Ascension (J2000)
10- 14	F5.2	s	RAS	Second of Right Ascension (J2000)
	16	A1	DE-	Sign of the Declination (J2000)
17- 18	I2	deg	DEd	Degree of Declination (J2000)
20- 21	I2	arcmin	DEm	Arcminute of Declination (J2000)
23- 27	F5.2	arcsec	DEs	Arcsecond of Declination (J2000)
29- 33	F5.2	mag	F814Wmag	F814W-band apparent magnitude
35- 39	F5.2	mag	F606Wmag	F606W-band apparent magnitude
41- 46	F6.2	mas/yr	pmGLAT	Proper motion along GLAT
48- 53	F6.2	mas/yr	pmGLON	Proper motion along GLON

Note (1): The first two stars are the ellipsoidal variables.

History:

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(End)Prepared by Tiphaine Pouvreau [CDS]28-Mar-2017