

STATISTICAL ANALYSIS OF WHITE DWARFS' PROPERTIES AND NEW WHITE DWARFS FROM GAIA

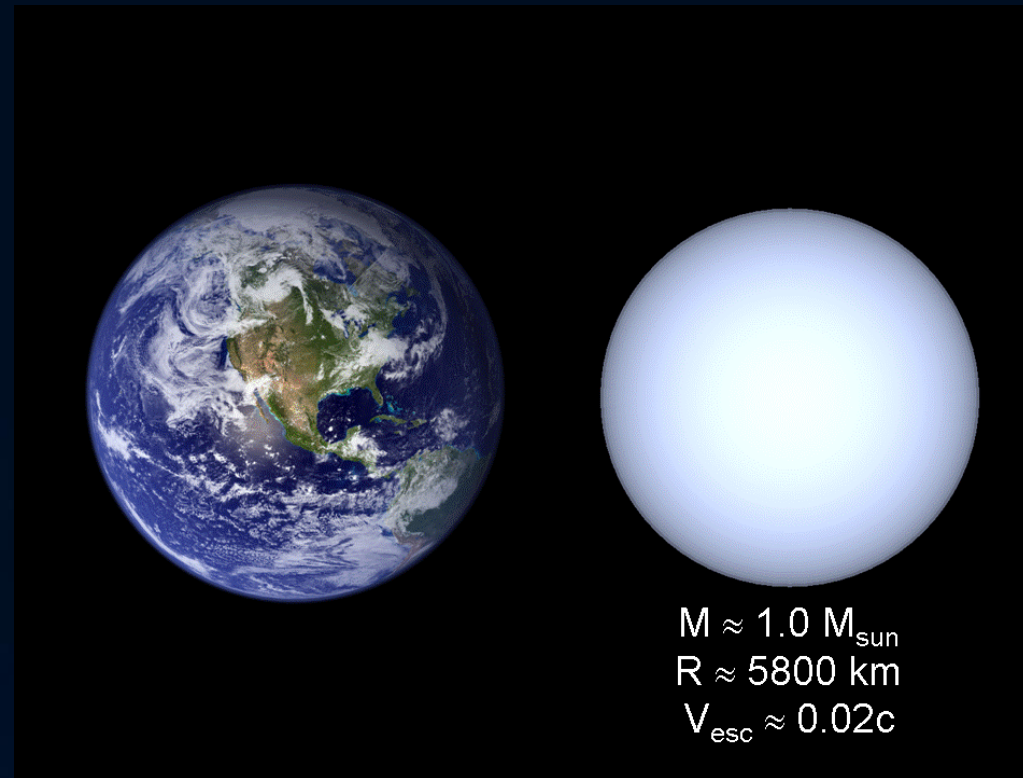
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BIGSKYEARTH CONFERENCE: ASTROGEOINFORMATICS
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TENERIFE, SPAIN

What is a white dwarf?

Is a stellar remnant composed mostly of electron-degenerate matter. They are very dense: a white dwarf's mass is comparable to that of the Sun, and its volume is comparable to that of the Earth.

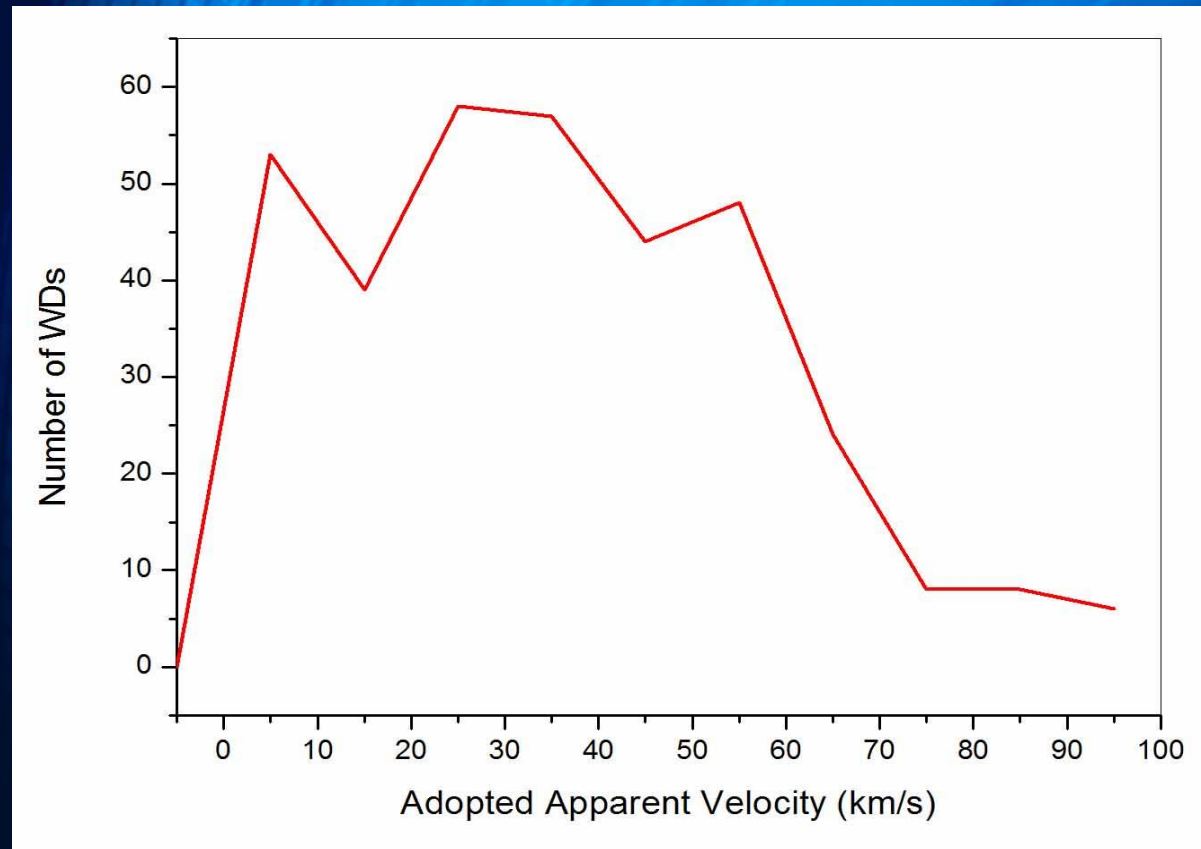
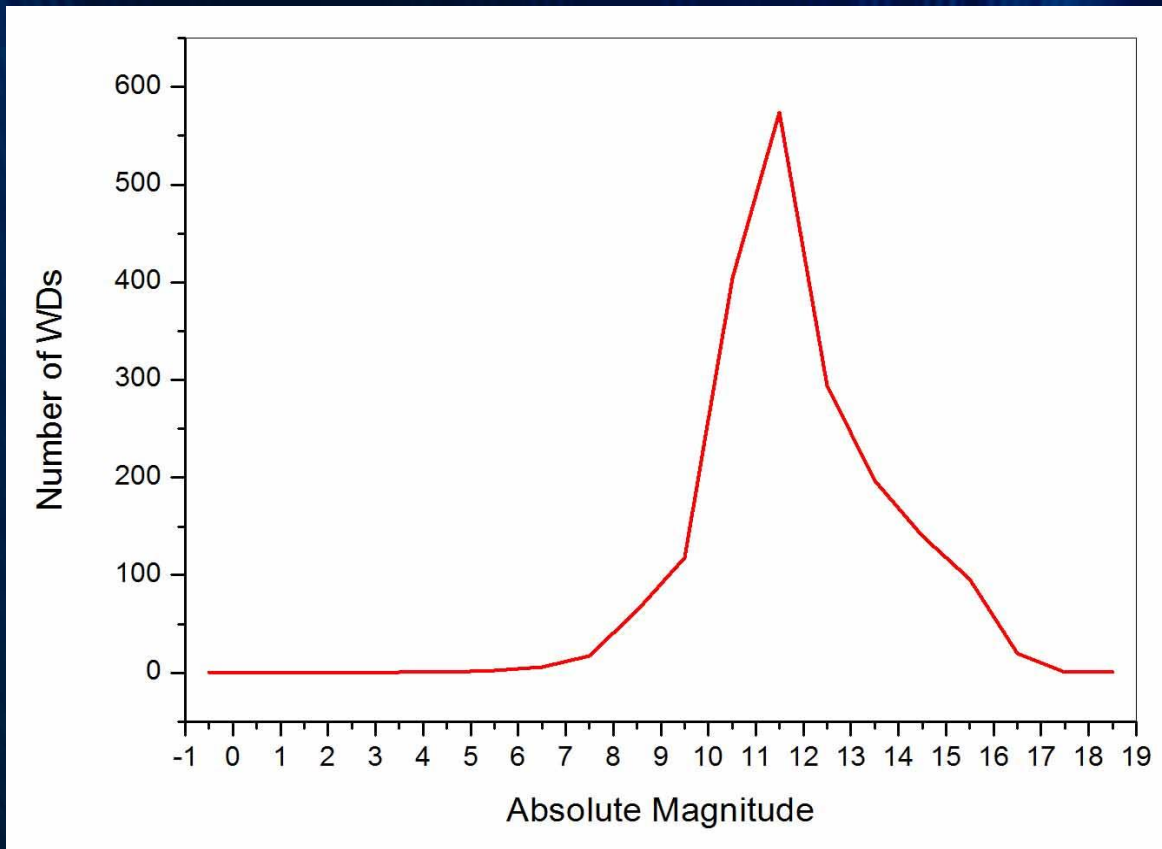


The Catalogue of Spectroscopically Identified White Dwarfs

(Version April 2014) by G. P. McCook and E. M. Sion

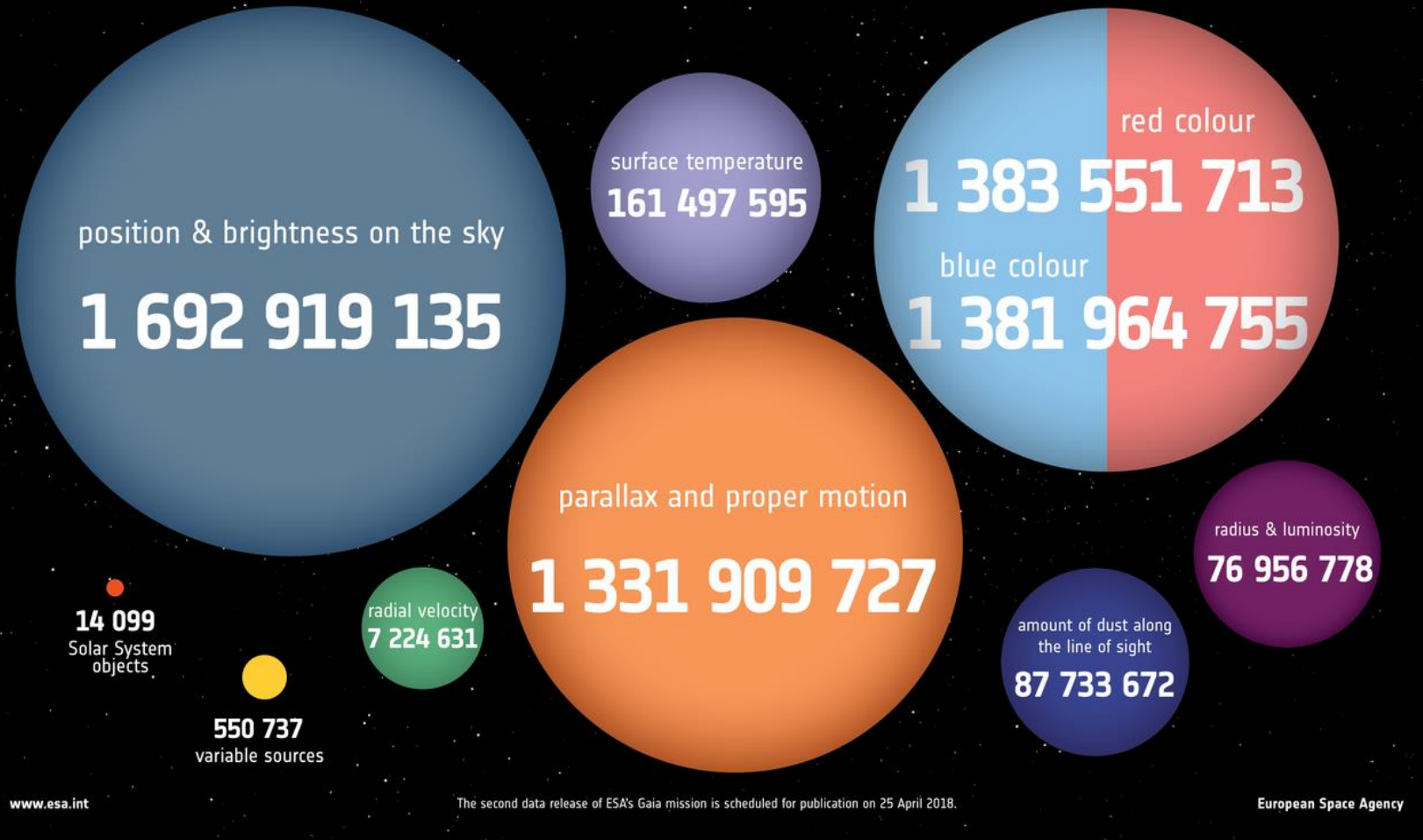
The total number of white dwarfs (WDs) in this version is **14294**:

- ❖ Having parallaxes 368, range 0.0001-0.575, average 0.046
- ❖ 10871 have total PM in the range of 0.0010-4.0800 arcsec/year;
- ❖ only 345 have adopted apparent velocities (Adp-V) in the range of 0.058-97.190 km/s, among them 328 (95.1%) have velocities less than 75 km/s;
- ❖ 1937 objects have absolute magnitudes in the range of -0.11...18.10; the distribution by AbsMag shows that we can consider as the limit for WD 7.5^m (brighter WDs are extremely rare;
- ❖ 1919/1937 are fainter than 7.5^m, 99.1%) or even 9.5^m (1792/1937, 92.5%). The sample is incomplete after 11.5^m (the graph goes down).

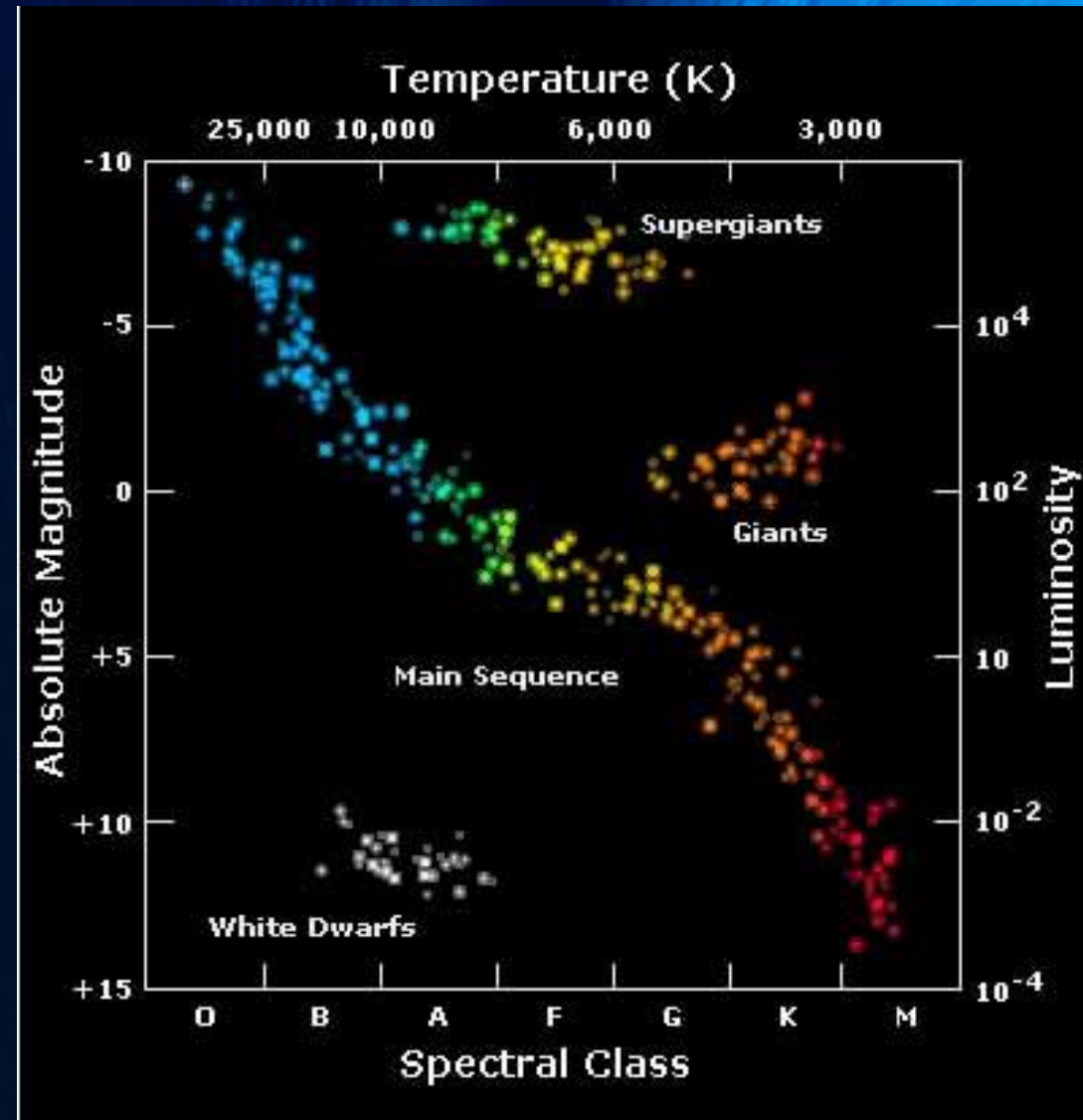


Distribution of absolute magnitudes and adopted apparent velocities for McCook & Sion Catalogue WDs allowing estimate the limit of M_{abs} for white dwarfs (two breaks at 7.5^m and 9.5^m) and the limit of the apparent velocity (the break at 75 km/s). Adopting these values we could distinguish WDs from the other stars.

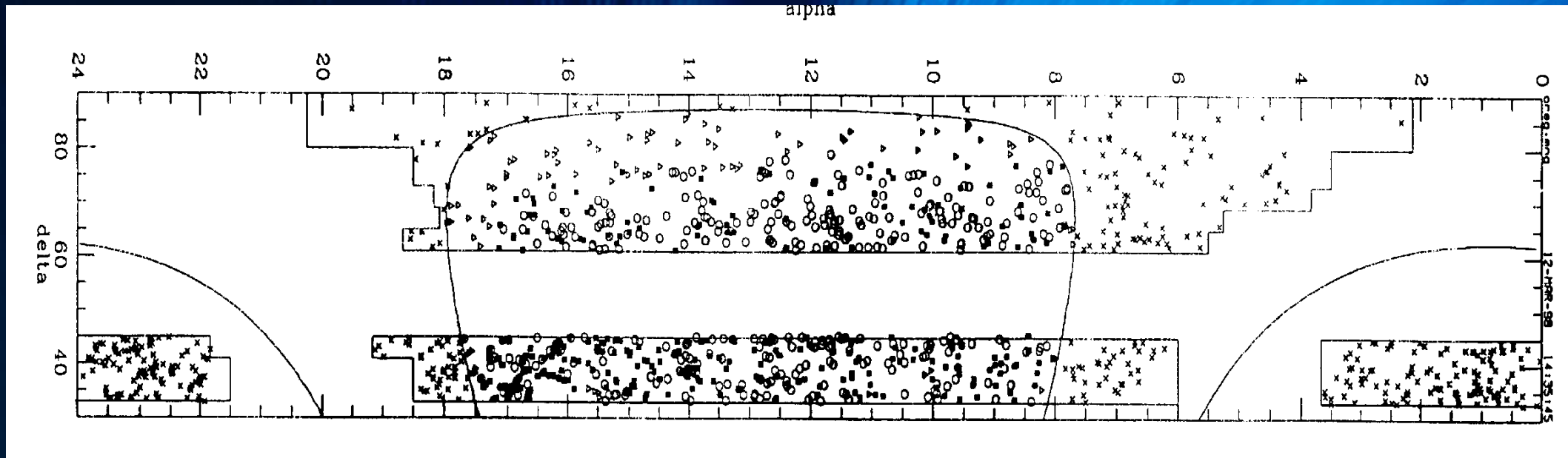
→ HOW MANY STARS WILL THERE BE IN THE SECOND GAIA DATA RELEASE?



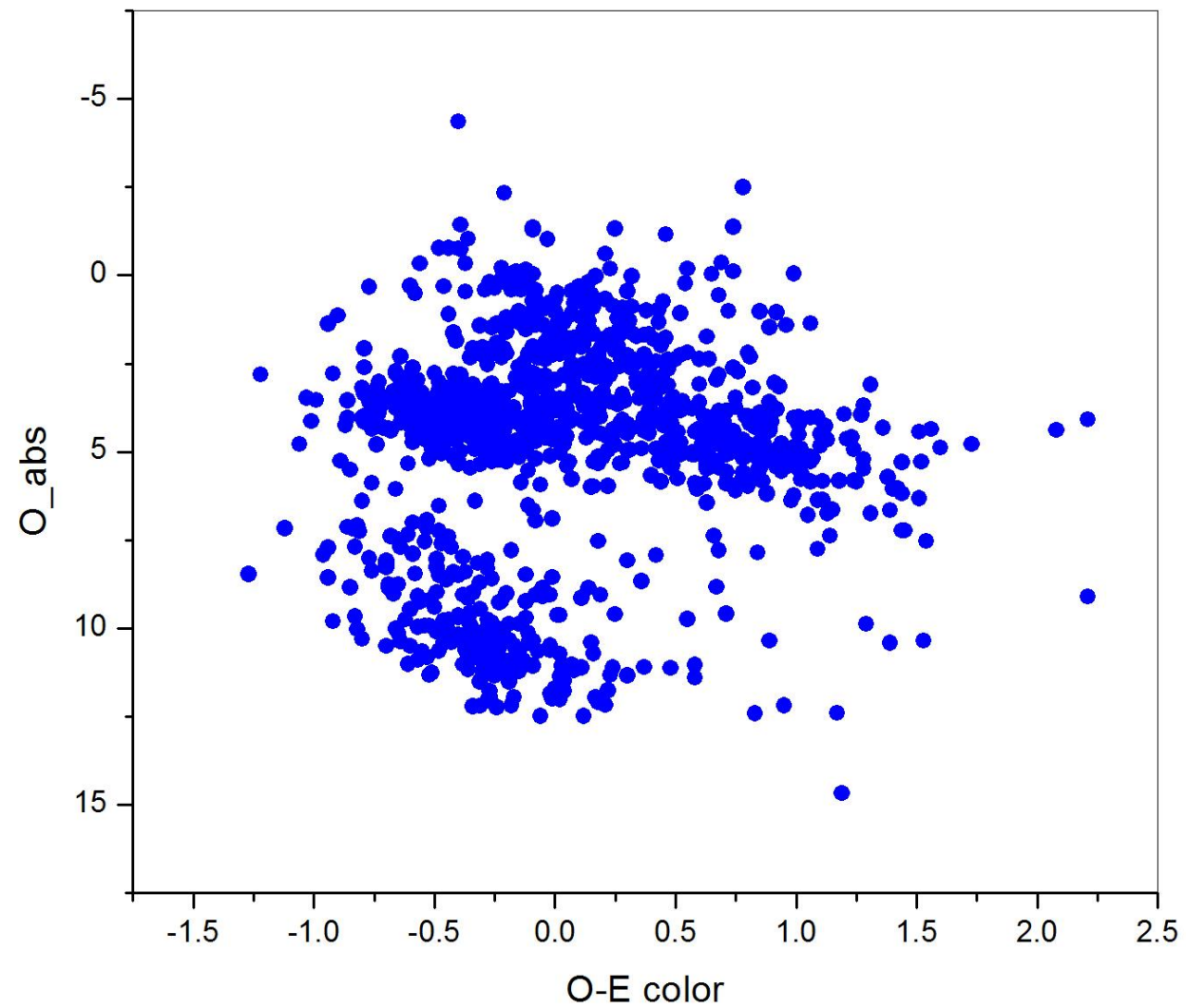
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FBS Blue Stellar Objects



| | |
|--------------------------|---|
| Years: | 1987-1996 |
| Region of sky: | $+33^{\circ} \leq \delta \leq +45^{\circ}$, $+61^{\circ} \leq \delta \leq +90^{\circ}$, 11 zones of the FBS |
| Total area: | 4,009 deg ² (278 fields, 438 plates) |
| Limiting magn: | 17 ^m -17.5 ^m ($\leq 18.5^m$) |
| Revealed objects: | O-B5, HBB, sd, WD, PNN, CV, QSO, Sy, compact gals |
| Number of objs: | 1103, including 716 new BSOs |
| Publication: | 11 lists (1990-1996), Catalog at CDS (Strasbourg) |
| New FBS plates: | 28 plates in 19 Milky Way fields, 288 deg ² (1988) |

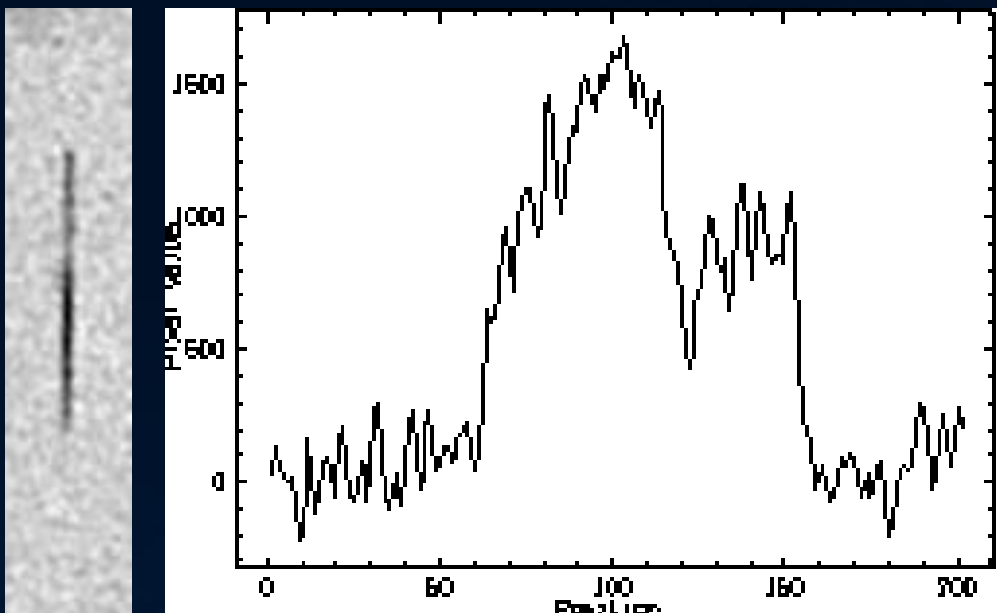


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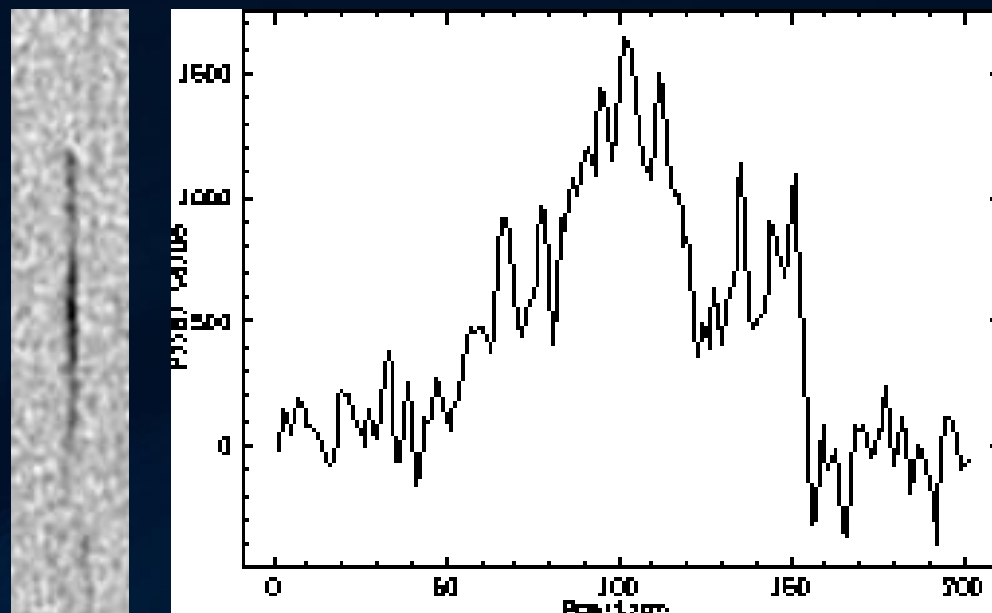
Digitized First Byurakan Survey (DFBS)

Table 4. Main scanning and resulting characteristics of the DFBS.

| Items | Description |
|----------------------|--|
| Teams | Byurakan Astrophys. Obs., Univ. Roma “La Sapienza”, Cornell Univ. |
| Years | 2002–2005 |
| Instrument | Epson Expression 1680 Pro scanner |
| Scanning options | 1600 dpi (15.875μ pix size), 16 bit, transparency mode, “scanfits” |
| Plate size | 9601×9601 pix, 176 MB file |
| Spectra | 107×5 pix (1700μ in length) |
| Dispersion | $33\text{ \AA}/\text{pix}$ average ($22\text{--}60\text{ \AA}/\text{pix}$), 28.5 at $\text{H}\gamma$ |
| Spectral resolution | 50 \AA (average) |
| Astrometric solution | 1” rms accuracy |
| Scale | $1.542''/\text{pix}$ |
| Photometry | 0.3^m accuracy |
| Data volume | 1874 plates, ~ 400 GB |
| Number of objects | $\sim 20,000,000$ ($\sim 40,000,000$ spectra) |



PG 0109+111 (DO)



PG 1449+168 (DA3)

RESULTS

- We have carried out **statistical analysis of WD Catalogue**: range and average numbers for absolute magnitudes, colors, proper motions, T_{eff} , etc. have been established; the limits of adopted tangential velocities for calculation of the absent proper motions were derived;
- revealing thousands of **new White Dwarfs from Gaia DR2 accurate astrometry**;
- revealing thousands of **new spectroscopically identified White Dwarfs at high Galactic latitudes from SDSS**;
- identifying **all White Dwarfs among the FBS blue stellar objects (185)**;
- revealing thousands of **new high Galactic latitude White Dwarfs** in the DFBS;
- publication of a **new catalog of White Dwarfs at high Galactic latitudes** (expected).



THANK YOU FOR ATTENTION!!!

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