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# The Digitized First Byurakan Survey (DFBS): a unique database for proper motion, variability studies, and object classification

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**Abstract.** The Digitized First Byurakan Survey (DFBS) is the digitized version of the famous Markarian survey plates. A few thousand important objects were discovered by means of this database, including the Markarian galaxies, quasars, cataclysmic variables, white dwarfs, carbon stars, etc. Optical identifications for some 1500 IRAS sources have been carried out as well. The DFBS plates were taken in 1965-1980, thus giving additional chance to investigate the high-galactic regions of the northern sky for proper motions (PM), variability, and roughly classify large number of objects in the given area. The astrometric and photometric accuracy of the DFBS plates were proven during the tests of the astrometric solution and photometric consistency. Thus, the DFBS spectra and the derived O and E magnitudes can be used together with the DSS1 and DSS2 for variability studies in a large area (17,000 $deg^2$). A search for PM stars and variable objects has been started. Accurate measurements based on DFBS, DSS1 and DSS2, as well as using data from USNO-B1, revealed 78 stars among the FBS blue stellar objects with significant PM, including 57 known WDs, and 1 known subdwarf from the Palomar-Green survey. Thus, 20 new candidate WDs have been revealed. Brightness differences between DFBS, DSS1 and DSS2, as well as using data from MAPS, USNO-B1, etc., revealed 16 objects with MAPS-FBS magnitudes > $2.5^m$, all candidate CVs. FBS 882 and FBS 218 turned to be extremely variable objects; FBS 882 has MAPS O=18.14 (DSS1 epoch), but in DSS2r it is near the plate limit and should be $\sim 21^m$. FBS 218 has no MAPS detection, but its FBS magnitude is $15.5^m$, which is much brighter than DSS1 (near the plate limit, $\sim 21^m$, as well as the estimated DSS2r magnitude $\sim 18^m$). A very high PM star, FBS 0250+167 among the FBS objects was revealed (PM = $5.13''$/year). It is an M7-M8 type dwarf, with $13.5^m$-$14.0^m$ on the DFBS, and $M_{abs}$=17.89. Its distance is estimated as 2.8 *pc*, and the tangential velocity, 68.1 km/sec. This is the $12^{th}$ known high PM star, and the faintest both in apparent and absolute magnitudes.

**Key words.** Surveys: extragalactic – Stars: white dwarfs – Stars: carbon – Galaxies: AGN

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