

# Alerting observations of asteroids at the SBG telescope of the Kourovka Astronomical Observatory in the Gaia-FUN-SSO Network

**Eduard Kuznetsov, Dmitry Glamazda,  
Galina Kaiser and Yulia Wiebe**

Kourovka Astronomical Observatory,  
Institute of Natural Sciences and Mathematics, Ural Federal University,  
Lenin ave., 51, Yekaterinburg, Russia, 620000  
email: [eduard.kuznetsov@urfu.ru](mailto:eduard.kuznetsov@urfu.ru)

**Abstract.** Regular astrometric observations of small bodies of the Solar System are conducted using a SBG telescope of the Kourovka Astronomical Observatory of the Ural Federal University. The first results of participation in Gaia-FUN-SSO network are presented.

**Keywords.** minor planets, asteroids

---

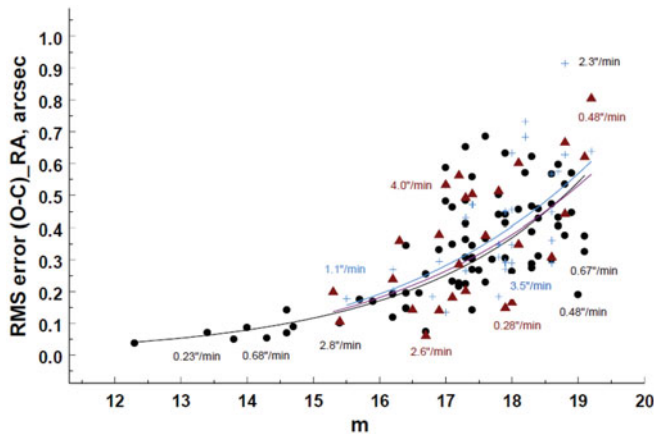
## 1. Introduction

Regular astrometric observations of small bodies of the Solar System are conducted using a SBG telescope of the Kourovka Astronomical Observatory of the Ural Federal University (AO UrFU). The four-axis SBG telescope with a 798.9 mm focal length is equipped with a Schmidt optical system and a 500 mm diameter main mirror. The aperture diameter is 420 mm. An Apogee Alta U32 CCD camera with a KAF-3200ME-1 CCD matrix containing  $2184 \times 1472$  elements, each of size  $6.8 \times 6.8 \mu\text{m}$  is mounted at the main focus of the telescope. The scale of the CCD image is 1.76 arcsec/pixel. The field of view of the system is  $61.2 \times 42.5$  arcmin. Limiting magnitude is 19 mag. The precision timing system uses a 12-channel GPS receiver Acutime 2000 GPS Smart Antenna. The SBG telescope and the CCD system are operated by the SBGControl software (Glamazda 2012) developed at AO UrFU.

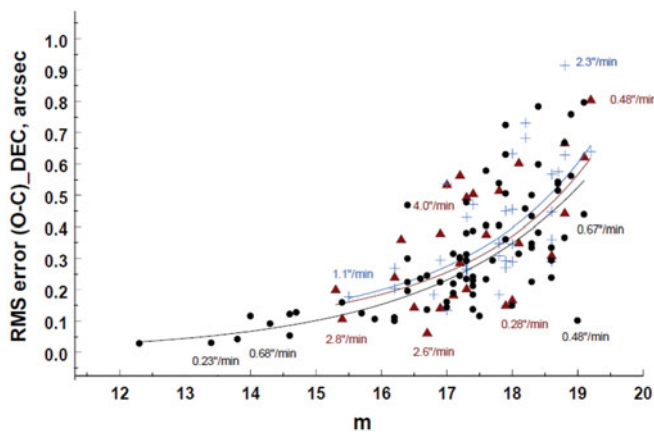
## 2. Results

We participated in three campaigns of observation which were organized by the Gaia-FUN-SSO Network. The asteroid 2013 TV135 was observed in October 2014. The asteroid 2007 HB15 was not detected because it was very faint object for the SBG telescope. The near-Earth object 2014 HQ124 was not observed because the sky was very light in a nautical twilight near a day of summer solstice.

Analysis of quality of astrometric observations of small Solar System bodies with the SBG telescope is given in (Kaiser & Wiebe 2017). Fig. 1 and 2 show the root-mean-square (RMS) residuals (O–C) in a right ascending and declination depending on magnitudes of asteroids. We use follow notes: Main Belt asteroids are (●), near-Earth objects are (+) and potentially hazardous objects are (▲). Velocities of an apparent motion of some asteroids are given. The RMS residuals (O–C) in coordinates are from  $0.07''$  to  $0.15''$  for



**Figure 1.** The RMS residuals (O–C) in a right ascending vs magnitudes  $m$  of asteroids.



**Figure 2.** The RMS residuals (O–C) in a declination vs magnitudes  $m$  of asteroids.

objects with magnitude less than  $14.5^m$ . If magnitude is risen to  $19^m$ , the RMS residuals (O–C) grow to  $0.8''$  for Main Belt asteroids and  $1.0''$  for potentially hazardous objects.

There are not positive results of alerting observations of asteroids at the SBG telescope yet. Current the Gaia alerts asteroids are very faint to be observed with the SBG telescope. We are going to continue alerting observations in the Gaia-FUN-SSO Network.

### 3. Acknowledgments

G. K. and Yu. W. acknowledge funding from the Ministry of Education and Science of the Russian Federation (the basic part of the State assignment, RK no. AAAA-A17-117030310283-7). E. K. and D. G. acknowledge funding from the Government of the Russian Federation (Act no. 211, agreement no. 02.A03.21.0006).

### References

- Glamazda, D. 2012, *Astrophys. Bulletin*, 67, 237  
 Kaiser, G. & Wiebe, Yu. 2017, *Solar System Research*, 51, 233