Results of near-Earth-asteroid photometry in the frame of the ASPIN programme

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Regular photometric observations aimed for obtaining physical properties of near-Earth asteroids (NEA) are carried out within the Asteroid Search and Photometry Initiative (ASPIN) of the International Scientific Optical Network (ISON). At present, ISON project joins 35 observation facilities in 15 countries with 80 telescopes of different class. Photometric observations of NEAs are carried out at the telescopes with apertures from 20 cm up to 2.6 m equipped with CCD cameras. The obtained lightcurves in the Johnson-Cousins photometric system or in exceptional cases in the integral light (unfiltered photometry) have typical photometric accuracy of 0.01–0.03 mag. The main targets of these observations are near-Earth asteroids as hazardous objects pose a threat for the Earth civilization. The main purpose of the observations is to study characteristics of asteroids such as rotation period, size, and shape of the body, and surface composition. The observations are aimed toward searching binary asteroids, supporting the asteroid radar observations and investigation of the YORP effect.

In 2013, we have observed 40 near-Earth asteroids in more than 200 nights. The rotation periods have been determined for 14 NEAs for the first time and, for 6 NEAs, rotation periods were defined more precisely. New rotation periods have been obtained for objects from Aten group: (137805) 1999 YK_5, (329437) 2002 OA_{22}, (367943) Duende (2012 DA_{14}); Apollo: (17188) 1999 WC_2, (137126) 1999 CF_9, (163249) 2002 GT, (251346) 2007 SJ, 2013 TV_{135}; Amor: (9950) ESA, (24445) 2000 PM_8, (137199) 1999 KX_4, (285263) 1998 QE_2, (361071) 2006 AO_4, 2010 XZ_{67}, and refined for (1943) Anteros, (3361) Orpheus, (3752) Camillo, (7888) 1993 UC, (53435) 1999 VM_{40}, (68216) 2001 CV_{26}. NEAs (7888) 1993 UC and (68216) 2001 CV_{26} were found to show signs of a binary nature. To detect possible binary asteroids, we observe the object during several consecutive nights and at several observatories located at different longitudes. In particular, to cover a long time interval and not to miss the eclipse/occultation minima, the binary NEA (285263) 1998 QE_2 has been observed in close dates in Ukraine, Georgia, Tajikistan, Mongolia, the Far East of Russia, and Mexico. To test an influence of the YORP effect on the spin rates, the lightcurves of NEAs (2100) Ra-Shalom, 88710 2001 SL_9, and (138852) 2000 WN_{10} have been obtained. The observations of small NEAs (with diameters smaller 200 m) have revealed very fast rotating NEAs with rotation periods smaller than 2.2 hours for (363305) 2002 NV_{16}, 2000 KA, and 2013 QR_1. Many of our targets were also the targets of the radar observations in the Arecibo and the Goldstone. The obtained results will be presented and the perspectives of the ASPIN programme will be discussed.