

## PHOTOMETRY OF ASTEROIDS IN CROWDED STAR FIELDS IN SBNAF PROJECT

M. Butkiewicz-Bąk<sup>1</sup>, A. Marciniak<sup>1</sup>, S. Geier<sup>2,3</sup>, R. Artola<sup>4</sup>, C. Colazo<sup>4</sup>, R. Duffard<sup>5</sup>, C. Girardini<sup>4</sup>, R. Melia<sup>4</sup>, C. Quiñones<sup>4</sup>, M. Tornatore<sup>4</sup>

<sup>1</sup>Astronomical Observatory Institute, Faculty of Physics, A. Mickiewicz University, Słoneczna 36, 60-286 Poznań, Poland

<sup>2</sup>Instituto de Astrofísica de Canarias, C/ Vía Láctea, s/n, E38205 La Laguna, Tenerife, Spain

<sup>3</sup>Gran Telescopio Canarias (GRANTECAN), C/ Cuesta de San José, s/n, 38712, Breña Baja, La Palma, Spain

<sup>4</sup>Estación Astrofísica de Bosque Alegre - Grupo de Astrometría y Fotometría, Laprida 854, X5000BGR Córdoba, Argentina

<sup>5</sup>Departamento de Sistema Solar, Instituto de Astrofísica de Andalucía (CSIC), Glorieta de la Astronomía s/n, 18008 Granada, Spain

**Introduction:** Small Bodies: Near and Far is a project which was created to construct the most complete picture of asteroids, these close ones, like near-Earth, main-belt asteroids, Trojans, and these farthest, like trans-Neptunian objects [1].

To obtain valuable data we are using various methods such as photometric, thermal, and radar observations, stellar occultations, adaptive optics, and *in-situ* observations, and then combine them using innovative numerical tools.

Our work is focused on improvement of lightcurve data, verification critical parts, and recovery the data. We present preliminary results of photometric observations of SBNAF target, 911 Agamemnon, a Jupiter Trojan asteroid.

**Photometry:** Times-series photometry was obtained with Cerro Tololo Inter-American Observatory (Chile) with 0.6-m telescope and one with Estación Astrofísica de Bosque Alegre (Argentina) with 1.54-m telescope in April 2016 (see **Tab. 1**).

Date	Telescope	Observer
2016 Mar 24	CTIO, 0.6-m	Geier
2016 Mar 25	CTIO, 0.6-m	Geier
2016 Apr 21	Cordoba, 1.54-m	Colazo

**Table 1.** Observational log of 911 Agamemnon.

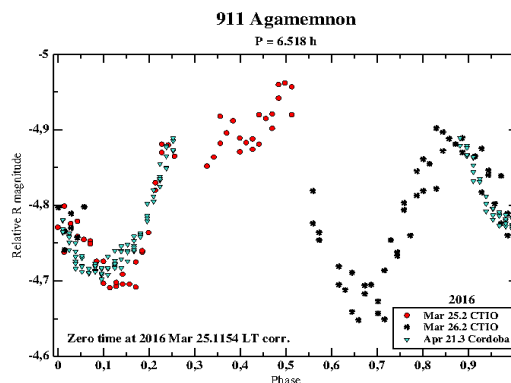
On the night of 25<sup>th</sup> of March 911 Agamemnon was moving among crowded star field. In that case we used the DAOPHOT (see [2]) to obtain the lightcurve of asteroid. The most important part of this procedure was removing

background stars by taking their point-spread functions from frames and subtracting them from original images. This process clean out stars around PSF asteroid.

**Results:** A 10th order Fourier series fit found a rotation period of  $6.518 \pm 0.05$  hr with amplitude 0.3 magnitude (**Fig. 1**). This result is very close to the value found during observations in 1997 [3]. Fig.1 shows composite lightcurve of 911 Agamemnon. During SBNAF project more observations of this object were conducted. The results of observational campaign of 911 Agamemnon will be shown during the meeting. New photometric observations are necessary to calculate spin and shape of this body.

After a careful testing of the procedure we want to apply it also to other data.

**Figure 1.** Phased lightcurve obtained over the course of 3 nights in March/April 2016.



**Acknowledgments:** The research leading to these results has received funding from the European Union's Horizon 2020 Research and

Innovation Programme, under Grant Agreement  
no 687378.



**References:** [1] T. Mueller et al. (2017) in preparation, [2] P.B. Stetson (1987), *PASP*,

99, 191, [3] S. Mottola et al. (2011), *AJ*, 141, 5, 32.