

Search for sub-kilometre sized trans-Neptunian objects using MIOSOTYS observations

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Abstract

We present here our preliminary results of the search for the sub-kilometre sized trans-Neptunian objects (TNOs) using the first 4 years campaign of a dedicated ground-based instrument MIOSOTYS ((Multi-object Instrument for Occultations in the SOLar system and TransitorY Systems). We will report in this conference how many more detections of possible occultation events (POEs) by analyzing these observations with the serendipitous stellar occultation method.

1. Introduction

MIOSOTYS is a fibre-based, high-speed (20Hz) photometer designed mainly for detecting serendipitous occultation events caused by sub-kilometre sized TNOs. MIOSOTYS mainly monitors stars with the angular sizes $\leq 2F_s$ (Fresnel Scale, $F_s = (\lambda D/2)^{\frac{1}{2}}$) because a passing TNO through the line of sight of a small star produces a diffraction-dominated phenomena. MIOSOTYS observes regions around the Opposition where the relative velocity of TNO is higher, the possibility of finding occultations is higher. MIOSOTYS has been mounted as a visitor instrument on the 1.93m telescope at Observatoire de Haute-Provence (OHP) since early 2010, and on the 1.23m telescope at Calar Alto Observatory (CAHA) since late 2012.

2. Observations

Between 2010-2013, MIOSOTYS has successfully carried out 18 observational runs: 14 runs at OHP and 4 runs at CAHA. We obtained more than 6000 image data cubes, and the total exposure time after screening is $\sim 3.0 \times 10^7$ sec, which is about 8426.69 star-hours, from 81 nights.

We used deviation method for the search of possible flux-drop outliers. After removing instrumental ones, we checked the reality of outliers by fitting with

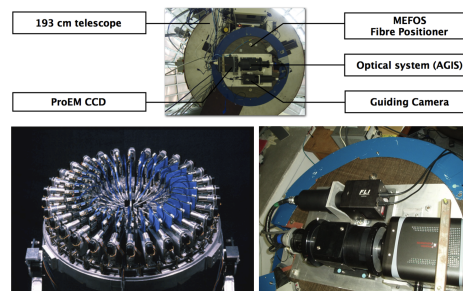


Figure 1: MIOSOTYS consists of three parts: 30 fibre positioning arms (MEFOS) fixed on a platform, an Acquisition and Guiding Image System (AGIS) above the arm platform, and a CCD camera (ProEM CCD).

a database of synthetic patterns. We will compare our preliminary results with other surveys ([1], [2]).

References

- [1] Schlichting, H. E., Fuentes, C. I., Trilling, D. E., 2013, AJ, 146, 36
- [2] Liu C.-Y., Doressoundiram A., Roques F., Chang H.-K., Maquet L., Auvergne, M., 2015, MNRAS, 446, 932