The search for trans-Neptunian stellar occultations with MIOSOTYS

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A very powerful method to detect tiny and invisible objects by the direct method is to look for their transit in front of a star; the serendipitous stellar occultation method (Roques et al, 2008 In *The Solar System Beyond Neptune*, eds. Barucci, Boehnhardt, Cruikshank and Morbidelli, University of Arizona press, 545-556.). Stellar occultation can detect kilometric objects beyond the orbit of Neptune. It is applicable provided the density of the objects is sufficient to cause a significant number of events. Due to their motion on the sky, solar system objects may pass in front of a star and occult it. If the projected stellar diameter is small enough (corresponding to bluer and fainter stars), the resolution is limited by the so-called Fresnel scale, $F_s = \sqrt{\lambda D/2}$, where λ is the observation wavelength and *D* the distance of the TNO.

MIOSOTYS (Multi-object Instrument for Occultations in the SOlar system and TransitorY Systems) is a multi-fiber positioner coupled with a fast photometry camera. It has been newly implemented at the cassegrain focus of the 193 cm telescope at the Observatoire de Haute-Provence, France. It is an arm positioner using 29 arms in a 26 arc-minute field. Each arm is equipped with an individual viewing system for accurate setting and carries one individual fiber that intercept 13" arcsec on the sky. All the 29 fibers are aligned on a frame-transfer EMCCD for fast photometry acquisition.
The association of fast photometry with a multi-fiber instrument and a 2 meters telescope provides a unique possibility to perform fast precise photometry on several targets in a large field. Our immediate goal is to characterize the spatial distribution and extension of the Kuiper Belt, and the physical size distribution of TNOs.

We will present the on-going observations campaign, objectives and observing strategy. We will discuss more specifically the method used to process the data, the VI (Variability Index) method (Roques et al. 2006, AJ, 132, 819-822) and the software developed to search for optimized target-stars for MIOSOTYS field of view.

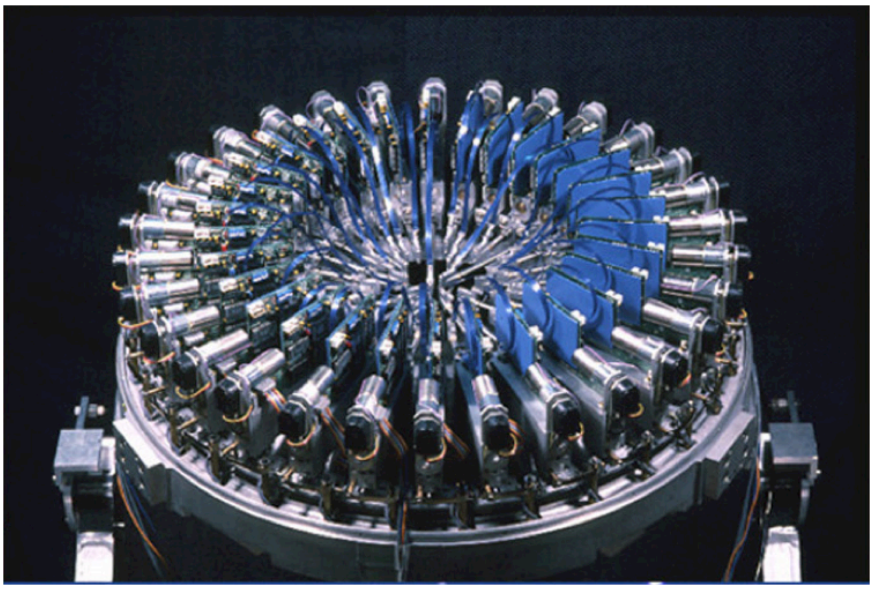

Figure 1 : The MIOSOTYS instrument with its arms system

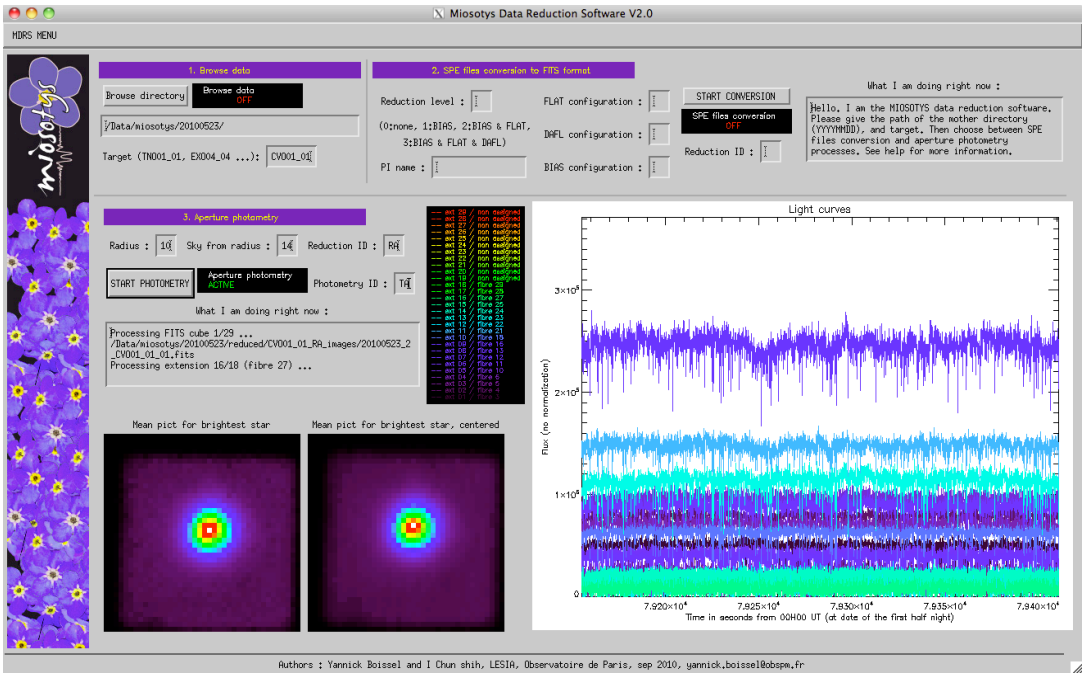

Figure 2 : quick view tool of MIOSOTYS