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- Planetary Defense – Recent Progress & Plans
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**STRATEGIES FOR SECURE AND RECOVERY
NEAR-EARTH OBJECTS**

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ABSTRACT

Observational campaigns for detection, secure and recovery of Near-Earth Asteroids (NEAs) are scheduled as perennial activities over Europe. For us, most of them are correlated/common activities inside the network Euronear[1,2]. Observing runs over one week are realized, using telescopes in the 0.5-1.2meter in diameter. During these runs, in order to secure newly discovered NEA orbits, astrometry is considered as top priority. Colors and lightcurves are also considered in order to provide a first attempt to physical characterization of these bodies.

Our first observational item for securing orbits of NEAs newly discovered is based on Minor Planet Center Confirmation Page. A second item is based on observation of asteroids having uncertainties into their orbits. However this second approach is mainly biased by technical constraints concerning the telescope and CCD (relatively small sized instruments and small field of views (between 64 and 169 square arc minutes)).

From our experience in the observing run of seven nights 5 hours per night are enough to observe with 1m telescope those targets available to the MPC Confirmation Page. On average 30-35% of the total time is enough to provide good astrometry. Thus, complementary targets and complementary science (photometry, spectroscopy) of NEAs become mandatory, in the context on which good geometry (ephemerides) for future observations of newly discovered objects occurs only few

times per century[3]. Lightcurves and color photometry obtained during the NEA discovery may provide important information for characterizing these new bodies.

Astrometric runs of NEAs on non-dedicated facilities are also constrained by scientific factors such as exploiting data on scientific publications (Figure 1). Thus, Minor Planet Electronic Circulars (M.P.E.C.) is a motivating factor in secure and extends astrometry toward long arc of orbits[4]. Sharing the data by fast online publication via M.P.E.C.s is strongly appreciated. Beyond the novelty character of astrometric observations of NEAs, providing also first physical of new discoveries is an important step into the global characterization of NEA population.

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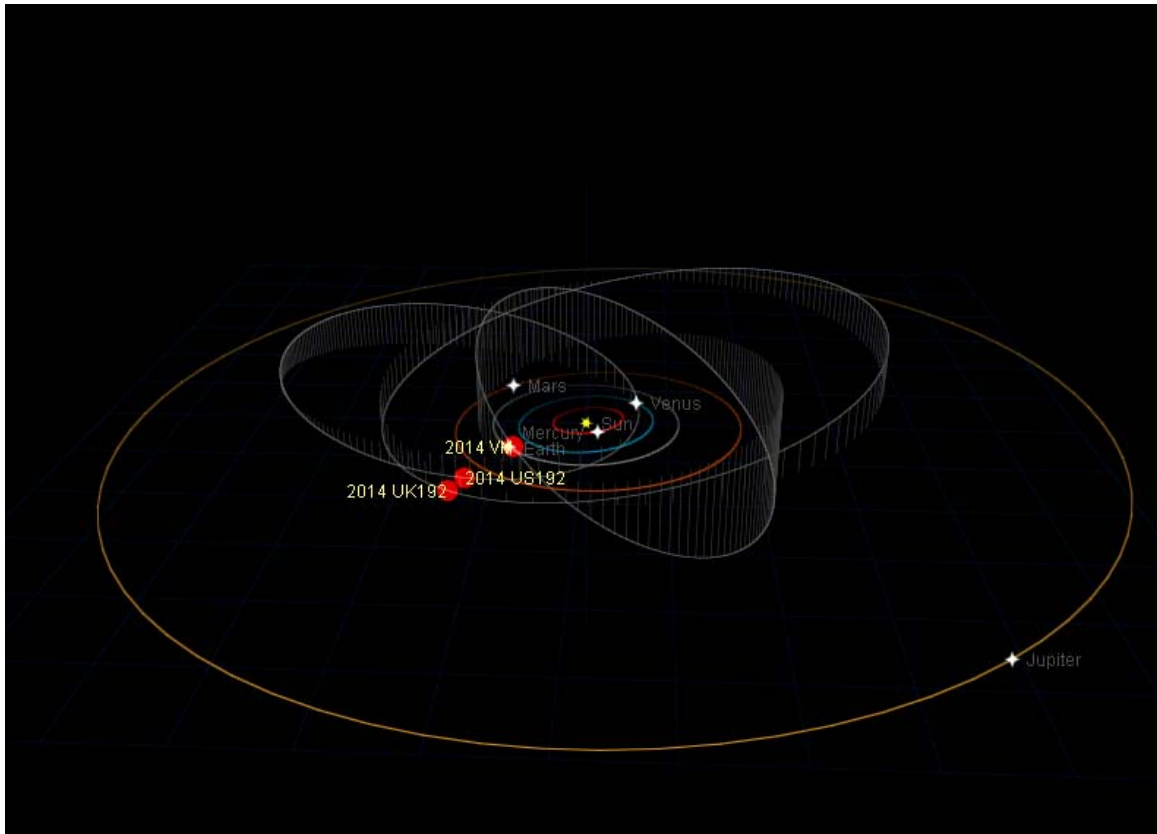


Figure 1. Plot of orbits for 2014 UK192, 2014 US192, and 2014 VM, which were confirmed and secured by MPC using also Pic du Midi (IAU code 586) 1meter telescope.

The summary of observational runs and results obtained used Pic du Midi 1meter telescope in France are presented.

References:

- [1] – Birlan et al, A&A,510, id A40, 2010
- [2] – Vaduvescu et al, PSS, 85, 2013
- [3] – Popescu et al, A&A, 535, id A15, 2011
- [4] – MPEC 2014-V20, 2014-V16, 2014-V15, 2014-V10, 2014-V25