# ABSTRACT BOOK



International Astronomical Union

# IAU XXVIth General Assembly

## Prague

14-25 August 2006

**S236-101 Poster**

**Astrometric Observations Of Asteroids And Comets At The Moletai Astronomical Observatory**

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We describe the observational project devoted to astrometric observations of Near-Earth Objects (NEO), main belt asteroids and comets at the Moletai Observatory, Lithuania. Exposures are obtained with the two telescopes of the observatory: 0.35/0.50-m f/3.5 Maksutov telescope and the 1.65-m f/3.1 reflector with a CCD camera. The results of more than 10000 positions of asteroids and comets have been published in the Minor Planet Circulars and Minor Planet Electronic Circulars. During the 2001--2006 period 125 new main belt asteroids were discovered and a few NEO objects were detected independently.

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**Use of combined CCD method of observations for NEO in Nikolaev observatory**

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The number of discovered by astronomers asteroids in tens and hundreds meters is increasing every year. Several hundreds of such bodies approach the Earth to 0.1 a.u. during the year. Use of small telescopes (D□1m) will significantly increase statistics of observations and accordingly improve prediction of asteroid's orbit. Combined CCD method of observations, developed in NAO, was tested for observations of NEO. The method is realized with the use of special mechanical device, the rotary platform. The rotary platform provides realization of drift-scan mode along the direction of visible motion of NEO, and for reference stars in their diurnal motion. Observations were made at such telescopes, as "Fast robotic telescope" (D = 300mm, F = 1500 mm) of Nikolaev observatory and AZT-8 (D = 700 mm, F = 2800 mm) of National control center and test of space means in Evpatoria. There were observed such NEO, as 2004WG1, 2005TF49, 2001SG276. The use of combined method has allowed to increase in 2.5 limiting magnitudes of telescopes. Accuracy of a single observation was 0□.1 – 0□.3. The accuracy of observations at the telescopes are given and the values of (O-C) from comparison with MPC data. It is possible to conclude, that the developed and realized in NAO combined method of observations significantly expands possibilities of small telescopes for observations of potentially hazardous asteroids for the Earth.

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**Solar System Bodies "Observations in the Past" with Plate Archive of Main Astronomical Observatory of Ukrainian NAS.**

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The improvement of the dynamical models of Solar System bodies' motions will be very useful for the future space astrometry mission GAIA for a fast identification of objects to discriminate between the well-known objects and the new ones. "Observations in the Past" with Plate Archives allow realising it.

The Plate Archive of the Main Astronomical Observatory of the National Academy of Sciences of Ukraine contains more then hundred thousand images of minor planets with magnitude up to $16^m.7$. About 10 % of minor planets, which may be found on our archive plates, were firstly discovered after time when plates have been taken. So we can rediscovery them by so called "observation in the past" and obtain their positions.

Now we intend to find, measure and define of orbital elements for: "rediscovered" asteroids, asteroids with out-of-truth orbits and Near Earth Objects. Other Solar System bodies for which we try to get those "observation in the past" are external planets' satellites.

The objects choose criteria, methods of it search, ider determination of position are discussed. The results of external planets' satellites search in MAO plate archive will b

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**New Methods for the Study of the Motion of Asteroids a**

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A review of the new effective methods based on a superosculating intermediate orbits developed by the autho These methods are meant for the following three main pr dynamical astronomy: 1) preliminary orbit determination; 2 initial parameters of motion; 3) high accuracy prediction o and velocities of celestial bodies.

For the solution of the first problem a new method of findi a celestial body with the use of two position vectors of this corresponding time interval is constructed. A method is prc for determining a preliminary orbit from three positions of a the celestial sphere that was developed by analogy with Lagrange–Gauss method.

To solve the second problem new algorithms are propose computation of partial derivatives of the current parameters respect to their initial values using the arcs of s intermediate orbits.

The applications of the orbits constructed in Encke's met perturbations and in the procedure for predicting the motio perturbed trajectory is represented by a sequence of shc intermediate orbits are suggested for solving the third ab problem. The first application leads to generalized Encke The second — to new methods for solving the equations of whose accuracy order coincides with the tangency intermediate orbit used. The application of the Runge rule a extrapolation allow us to obtain methods of higher orders.

The estimations of efficiency of the developed methods ir of investigation of motion of some minor planets and comets It is shown that the new methods raise the accuracy operation of machine computations as compared with analogous methods.

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**Initial Linking Methods and their Classification.**

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The problem of initial linking of asteroids is of increasing i next generation surveys. During the first week after disc elements are very uncertain and other methods are used. given of (8) initial linking methods. There are two different t search area is computed on a second night from th undoubtedly linked positions, typically on the first night. T assumes candidates which are then checked by the comp residuals of an orbit. Computations may be classified as be 3-dimensional space or the 2-dimensional sky-plane.

A new basis, with a simpler computational algorithm, is widely used Väisälä method. For a new method a simple programme is given.