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# ASTRONOMICAL RESEARCH: FROM NEAR-EARTH SPACE TO THE GALAXY

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**ABSTRACT BOOK**

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orbital plane) complements the system to right-handed. The velocity vector, V, and the particle radius, R, were calculated. Velocity vector was determined by its module, V, and by angles λ with the X axis and β with the Z axis. In addition, it was assumed that during some time interval Δt a particle splits into N parts. Parameters V and R were determined by the least squares. The values of Δt and N were determined by exhaustive search. The polynomials describing the displacement of the center of brightness obtaining from the positional observations have been used as observations. Because of the strong correlation between the angles λ and β the improvement of these variables was carried out by stages: in the beginning set of V, β, R was improved and then set of V, λ, R was improved. The results of the improvements and their errors are: V=1.18±0.06 m/sec; λ=-35°.16±0.01; β=68°.55±0.41; R=26.83±0.48 m. The values Δt, N found by sorting were equal to 20 days and 10,000, correspondingly. It means that the initial particle breaks up into 10,000 pieces within 20 days. Dynamics of the particle with the given parameters allows change in the center of brightness at 90 day interval to be predicted with the mean square error σ=0."184.

Thus, the offset of photocenter of Comet Holmes, derived from the positional observations can be simulated by the motion of large sublimating fragment or a few fragments as large as 53 m in diameter, which during 20 days fly away from the nucleus at a distance 1,208 km (921 km in the radial, 646 km in the transverse and 441 km in the normal direction). Then they are divided into smaller particles as small as 5.3 mm. After that the displacement of photocenter is determined the center of cloud of these particles. 90 days after the explosion these small particles are found at a distance of 4,260 km (893 km in the radial, in the transverse -3637 and 2032 km in the normal direction) from the comet's nucleus.

## AUTOMATED COMPLEX FOR ESTIMATION OF METEORS COORDINATES BY SCATTERING SIGNALS OF FM BROADCAST STATIONS

***F.I. Bushuev[1], U. N. Bondarenko[2], V.S. Vovk[1], N.A. Kalyuzhny[1], Y.S. Kosirev[1], A.S. Slivinskiy[1], A.V. Shulga[1]***

*[1]RI "Nikolaev Astronomical Observatory", Mykolaiv, Ukraine;*

*[2]RI "Odessa Astronomical Observatory", Odessa, Ukraine*

Frequency-modulated (FM) signal of a broadcasting transmitter, located in Kielce (Poland), is receiving for 24-hour in RI NAO. The Radiation frequency of the transmitter is equal to 88.2 MHz, and the

power is 120 kW. Output spectra of frequency demodulator are analyzed to detect a meteor reflection of radio waves. A method of restoring the analogue of amplitude-time characteristics of FM-signal (ATC-analog), which was developed earlier, is used. Characteristics of ATC-analogue are taken as a model of the signal reflected from the meteoroid trail.

As a result of visual data processing of experimental data the daily estimates of number of meteor signals from August 2010 to August 2011 were obtained. Meteor showers were detected. Time and duration of these showers coincide with the optical observations of IMO (International Meteor Organization).

Reception of FM-signal from Kielce's transmitter was carried out simultaneously at two receiver sites, located at the distance of about 145 km. Differences of noise conditions have been identified. They are caused by differences of temperature inversion on radio paths. The ability of estimations of path difference for radiowaves reflected from meteor was verified by signal convolution. Software for automated detection of meteor reflections of radio waves is developed.

## RESEARCH OF SEISMIC WAVES CAUSED BY STRONG EARTHQUAKES, WHICH WERE REGISTERED BY FEDCHENKO ASTRONOMICAL CLOCK

***F.I. Bushuev[1], N.A. Kalyuzhny[1], N.A. Kulichenko[1], M.A. Lazarenko[2], A.P. Slivinsky[1,3], A.V. Shulga[1]***

*[1]RI "Nikolaev Astronomical Observatory", Mykolaiv, Ukraine;*

*[2]Institute of Geophysics NASU, Ukraine;*

*[3]Ukraine Radio Engineering Institute, Mykolaiv, Ukraine*

Since September 2009, the simultaneous recording of readings of Fedchenko astronomical clock (FAC) and seismograph station is carried out in RI NAO. The purpose is to register seismic waves caused by earthquakes. In a few minutes before arrival of seismic wave the effect of an anomalous decrease of the background dispersion fluctuation of the FAC readings (predecessor) is detected. This effect is absent in seismograph station readings. This effect is presumably caused by super-low frequency electromagnetic radiation at the epicenter of the earthquake. The map of the epicenters of earthquakes with predecessors and without them is given. Signal/noise ratio of FAC and seismograph station is compared.