NEGATIVE WAVELENGTH GRADIENT OF POLARIZATION OF COMET 21P/GIACOBINI–ZINNER AS AN INDICATOR OF ORGANIC MATTER IN ITS DUST PARTICLES

N. N. Kiselev[1], K. Jockers[2], V. K. Rosenbush[3]

[1] *Astronomical Observatory of Kharkiv National University, Kharkiv, Ukraine*
e-mail: kiselev@astron.kharkov.ua

[2] *Max-Planck-Institut für Aeronomie, Katlenburg-Lindau, Germany*

[3] *Main Astronomical Observatory, NAS of Ukraine*
27 Akademika Zabolotnoho St., 03680 Kyiv, Ukraine

An unusual behaviour of the polarization of light scattered on dust particles in Comet 21P/Giacobini–Zinner is discussed. CCD imaging polarimetry of Comet Giacobini–Zinner was carried out at the 2-m telescope of the Pik Terskol Observatory (Northern Caucasus) on November 20, 1998 and January 25, 1999 using a two-channel focal reducer of the Max-Planck-Institute for Aeronomy (Germany). Narrow-band continuum filters centered at 4430/44 Å (blue continuum) and at 6420/26 Å (red continuum) were used. The comet was also observed in a wide-band red (7228/1140 Å) filter with the 70-cm reflector at the Observatory of Kharkiv National University on November 19–22, 1998. We have found that the degree of polarization of dust in the Comet Giacobini–Zinner in the blue continuum is in a good agreement with that of dust in the comets C/1987 P1 (Bradfield), C/1990 K1 (Levy), C/1996 B2 (Hyakutake) and C/1998 U5 (Linear) that were observed at the same phase angles. At the same time, permanently the polarization of Comet Giacobini–Zinner in the red continuum is about 2% less than in the blue continuum. Comets Bradfield, Levy, Hyakutake and Linear U5 display the usually observed in dusty comets increasing of the polarization with the wavelength. Contrary to all other comets, the wavelength gradient of the continuum polarization of Comet Giacobini–Zinner is negative. No other comet observed previously showed a similar wavelength dependence of polarization. First we checked if the reduced polarization of Comet Giacobini–Zinner in the red filters could be explained by the gas contamination and were convinced that it could not. We also checked if the inversion of polarization color in local parts of the coma could not produce a negative spectral gradient of the polarization for the whole coma of this comet and it could not as well. Thus, it seems reasonable to assume that the observed anomalous spectral dependence of polarization is caused by properties of dust particles. In particular, one of possible interpretations is connected with a high abundance of organic matter in the dust. The Draconid meteors associated with this comet support the presence of organic matter in the large dust grains of Comet Giacobini–Zinner, which is depleted in carbon species in the gas phase.