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Polarimetry of the dwarf planet (136472) Makemake

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We present the first polarimetric observations of one of the largest transneptunian objects: (136472) Makemake. The linear polarization of Makemake was measured in April-May 2011 in the Bessel R filter with the FOSR2 instrument of the ESO VLT. In the phase-angle range 0.6-1.1 deg, we measured a small amount of negative polarization (about -0.3%), nearly constant within the accuracy of our measurements (0.05-0.1%).

Our new data confirms the existence of two distinct types of polarimetric behaviours found for large and small transneptunian objects [1]. The polarization phase curve behavior of the Makemake is similar to that of other large TNO's, which all show a small polarization in the scattering plane slowly changing in the observed phase angle range. The amount of polarization measured for Makemake is more similar to that measured in Eris than in Pluto when we consider the values obtained at the same phase angles. The polarization of Makemake's surface at 1 deg of phase angle is the smallest one (in absolute term) if compared to any other icy Solar system bodies measured so far. It gives additional evidence in favour of the particular surface properties of the Makemake found from thermal modeling [2]. In this poster we will discuss the constraints on the surface characteristics of Makemake set by our new measurements combined with previously available data.

[1] Bagnulo, S., Belskaya, I., Muinonen, K., Tozzi, G.P., Barucci, M. A., Kolokolova, L., Fornasier, S., Discovery of two distinct polarimetric behaviours of transneptunian objects. Astron. Astroph. 491, L33, 2008.

[2] Lim, T. L., Stansberry, J., Muller, T.G., et al.: A survey of the trans-Neptunian region. III. Thermophysical properties of 90482 Orcus and 136472 Makemake. Astron. Astroph. 518, L148, 2010.