ROTATIONAL PROPERTIES OF CENTAURS AND TRANS-NEPTUNIAN OBJECTS: RESULTS FROM THE ESO LARGE PROGRAM. D. Perna[1,2,3], E. Dotto[3], M. A. Barucci[1], A. Rossi[4], C. de Bergh[1], A. Doressoundiram[1] and S. Fornasier[1,5], [1]LESIA – Observatoire de Paris, 5, place J. Janssen, F-92195 Meudon Principal Cedex, France. davide.perna@obspm.fr, [2]Università degli Studi di Roma Tor Vergata, Dipartimento di Fisica, via della Ricerca Scientifica 1, I-00133 Roma, Italy, [3]INAF – Osservatorio Astronomico di Roma, via Frascati 33, I-00040 Monte Porzio Catone, Italy, [4]ISTI-CNR, via G. Moruzzi 1, I-56124 Pisa, Italy, [5]Université Paris Diderot – Paris 7, Paris, France.

Introduction: It is widely believed that the present rotational state of Trans-Neptunian Objects (TNOs) is the outcome of the collisional evolution suffered by these bodies. Therefore, the analysis of their rotational properties can provide us useful information on their history and internal structure. Unfortunately the presently available sample of known rotational rates is still rather limited, including periods of about 30 TNOs and of a dozen of Centaurs [1].

In order to increase this sample, in the framework of the ESO Large Program 178.C-0036 (P.I.: M. A. Barucci), we carried out at ESO-NTT (La Silla, Chile) photometric observations of 2 Centaurs (12929 1999 TZ_1 and 95626 2002 GZ_{32}) and 10 TNOs (42355 Typhon, 47932 2000 GN_{171}, 65489 Ceto, 90568 2004 GV_9, 120132 2003 FY_{128}, 144897 2004 UX_{10}, 145451 2005 RM_{43}, 145453 2005 RR_{43}, 2003 UZ_{117} and 2003 UZ_{413}).

Observations and data reduction: The observations were performed during two runs (April 2007, December 2007) at the 3.58m New Technology Telescope (NTT) of the European Southern Observatory (La Silla, Chile). We used the EMMI instrument in RILD mode for wide field imaging with the Bessell-type R filter (centered at 6410Å). Data from the April 2007 run (7 out of the 12 observed objects) were already reduced and analysed, and a paper was submitted [2]. Data from the December 2007 run are currently under reduction. The CCD images were reduced with a standard method and the obtained data were light-time corrected. The instrumental magnitudes were measured using aperture photometry with an integrating radius typically about three times the average seeing, and sky subtraction was performed using a 5-10 pixels wide annulus around each object. Since the sky conditions were not photometric the absolute calibration was not performed.

Results: Applying the method based on the Fourier analysis of the lightcurves, developed by Harris et al. [3], rotational synodic periods were computed. We determined the spin rate for several objects and we confirmed previously published periods of two of them. For the objects for which we computed the rotational period, we estimated the axis ratio a/b, and hence their density. Our results seem to confirm the density/dimension trend found by Sheppard et al. [1], with larger (brighter) objects having higher densities.

The obtained complete results will be presented and discussed.

References:

[1] Sheppard S. S. et al. (2008) in *The Solar System Beyond Neptune*, Univ. of Arizona Press, pp. 129–142. [2] Dotto E. et al. (2008) *A&A*, submitted. [3] Harris A. W. (1989) *Icarus*, 77, 171-186.