# The Thermal Response of Asteroid Surfaces: Results from ESO Large Programme

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The YORP effect [1] is a torque due to reflected and thermally re-emitted solar radiation. The YORP effect can: change rotation rates and spin-axis orientations over relatively short time-scales, modify orbits (semimajor axis drift from the related Yarkovsky effect depends on the obliquity) and thus plays a key role in replenishment of the near-Earth asteroid (NEA) population, cause regolith mobility and resurfacing, form binary asteroids through equatorial mass loss and re-aggregation, and cause catastrophic disruption. When we began our systematic monitoring programme in 2010, the YORP effect had only been detected for three asteroids [2-4]. That has now increased to six [5-7]. All detections so far are in the spin-up sense, and theoretical studies are making progress in explaining this observation [8]. However, a much larger statistical sample is required to robustly test this theory. We are conducting an observational programme of a sample of NEAs to detect YORP-induced rotational accelerations. For this we use optical photometry from a range of small to medium size telescopes, supplemented by thermal-IR observations and thermophysical modelling to ascertain expected YORP strengths for comparison with observations. For selected objects, we use radar data to determine shape models. We will present our latest results and progress on YORP detections/upper limits for a subset of NEAs from our programme, which include: (1917) Cuyo, (8567) 1996 HW1, (85990) 1999 JV6, (6053) 1993 BW3, and (29075) 1950 DA.

[1] Rubincam (2000). Icarus 148, 2.
[2] Lowry et al. (2007). Science 316, 272.
[3] Kaasalainen et al. (2007). Nature 446, 420.
[4] Durech et al. (2008). A&A 489, L25.
[5] Durech et al (2012). A&A 547, A10.
[6] Lowry et al. (2014). A&A 562, A48.
[7] Durech et al. (2018), A&A 609, A86.
[8] Golubov, et al. (2014). ApJ 794, 22.