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Mid-infrared high spatial resolution observations of Saturn's rings with VISIR/VLT.

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The thermal emission of planetary rings mainly depends both on the dynamic of ring particles and their physical surface properties. Observing ring temperature can help us to constrain their thermal inertia, their spin rate and their vertical excursions above the ring plane. Azimuthal variations of ring temperature, their cooling rate when crossing the planetary shadow, and particles surface thermal contrast between their day and night sides, are specific of their thermal and rotational properties (Ferrari and Leyrat, 2006). We have observed Saturn's rings at low phase angle (6 degrees) on April 2005 at the Very Large Telescope (VLT/ESO), using the mid infrared spectro-imager VISIR, while the sun opening angle was -22 degrees. Imaging observations were carried out in the Q band, at 19.5 microns, with a high spatial resolution of 0.6 arcsec We present both radial and azimuthal profiles of the rings brightness temperature. In particular, the A ring's azimuthal profile contains modulations not present in B and C rings. They result from variations of the ring filling factor due to the presence of wakes in this region, as discovered by the CIRS/CASSINI spectrometer (Ferrari et al, 2005) which observed the A ring at the same epoch. A comparison with photometric optical depth calculated from dynamical local simulations, in order to constrain wakes dimensions, will be presented and discussed. The thermal inertia of particles in the A ring is found to be very low, at $\Gamma = 4 \pm 2 J.m^{-2}K^{-1}s^{-1/2}$. It is of the same order of magnitude as B and C ring's one, indicating probably a similar structure of the regolith.