Search for the metallic cores of differentiated planetesimals in the asteroid Main Belt

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Models of planet formation show that planetesimals formed in the terrestrial planet region can be scattered at larger heliocentric distances and trapped in the asteroid belt. The remnants of differentiated planetesimals, disrupted by catastrophic impacts, are thus presumed to be present amongst the asteroids that we observe today. Here we consider the case of asteroids belonging to the spectroscopic M-type: these bodies were initially thought to be metallic cores of differentiated planetesimals, exposed to space by a catastrophic impact. Later, this view has been challenged by the detection of silicates and hydration spectroscopic bands on these bodies.
Here we present a novel approach to infer the presence of iron in the regolith of asteroids by measurements of the thermal conductivity of the surface of these bodies. We present our investigation of the thermal conductivity of M-type asteroids, including the asteroids (16) Psyche. Our preliminary results confirm the existence of two populations of M-types: those with high thermal conductivity and those with low thermal conductivity. As iron has much higher thermal conductivity than other asteroid building material, high-thermal conductivity M-type asteroids might be the remnants of the metallic cores of differentiated planetesimals.