

## The Hera TGIP Sample Collector

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### Abstract

We are entering a phase of solar system exploration in which sample return is playing an increasingly important role. Many sample collectors have been developed or proposed, depending on the nature of the surface to be sampled and the complexity and cost of the mission. A collector for low-cost missions to bodies with regoliths is now being developed by the University of Arkansas as a touch-and-go-impregnable-pad (TGIP). TGIP is the collector on the Hera near-Earth asteroid sample return Discovery mission recently proposed to NASA. TGIP consists of a 1 cm deep layer of silicone grease, a high viscosity version of the oil used by NASA's cosmic dust collection program. The grease is encased within a retractable aluminum ring. A 12 cm disk can collect on the order of 100 g of material, ranging from dust to centimeter-sized fragments. By stacking collectors, the collected sample is protected from physical and chemical alteration until processing in the laboratory. We have recently completed collection, temperature, vacuum, impact, and radiation tests on this collector. The TGIP has a high collection efficiency, satisfactory vacuum performance, can withstand impacts of 2000 g (equivalent to direct re-entry without a parachute), and exposure to 640 times the radiation dose expected on a six-year mission. We are now developing procedures for processing the returned collectors, based on those used for the cosmic dust program.