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SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)

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LANDER-ROVER MISSION FOR SUB-SURFACE SAMPLING NEAR THE LCROSS IMPACT POINT

Abstract

Astrobotic Technology Inc. is designing a robotic expedition to the vicinity of Cabeus crater, within a few dozen kilometers of the LCROSS impact site. Launched on a Falcon 9 now under contract to Astrobotic, a lander will use optical navigation to enter lunar orbit and then descend to deliver a 120kg solar-powered rover with 70 meter accuracy and autonomous hazard avoidance. Arrival in July 2015 during summer solstice provides illumination in areas that are shadowed the remainder of the year, and therefore are expected to have the shallowest layer of dry soil covering the subsurface ice. The rover will be able to transport up to 80kg, sufficient for a half-meter drill and analysis devices to characterize the samples. The rover provides power and communications services to its payloads. Its design is being adapted from a polar excavation robot brought into prototype form under a NASA contract. The initial phase of the mission could be as short as five days or as long as nine days, depending on further analysis of expected illumination patterns and direct-to-Earth communications opportunities. The rover and lander are designed with batteries and avionics able to hibernate in cryogenic cold until the next summer solstice. In addition to carrying payload for space agencies, the expedition will deliver flight performance data to NASA under a $10 million contract awarded in 2010, under the Innovative Lunar Demonstrations Data program.$