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## **A Versatile, Low Cost Interplanetary Cruise Stage/Carrier Vehicle for Solar System Exploration**

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Northrop Grumman Aerospace Systems has developed an improved version of its highly successful Lunar Crater Observation and Sensing Satellite (LCROSS) spacecraft as a versatile, low cost, interplanetary cruise vehicle/science instrument carrier for solar system exploration. LCROSS, was successfully flown to the moon in 2009 as a secondary mission under the primary Lunar Reconnaissance Orbiter (LRO) mission. It delivered the launch vehicle upper stage to impact the lunar south pole and carried a suite of instruments, directly detecting lunar water, in the first ever use of an ESPA as an independent fully functioning satellite. As with LCROSS, the Eagle-S vehicle structure utilizes the EELV Secondary Payload Adapter (ESPA) and allows multiple ESPA ports to be used by the science payload. The spacecraft is compatible with most existing launch vehicles and has the unique attribute of being able to fly as the primary mission on the launch vehicle or as a secondary mission with another mission as the primary payload.

In this presentation we present the core spacecraft design, performance characteristic, potential experimenter accommodations, and other information for the core system and available options. To better illustrate the application to interplanetary missions we will present specific example mission concepts that illustrate the range of scientific performance: a planetary orbiter with a remote sensing payload, a planetary orbiter delivering a suite of scientific cubesats for distributed measurement, an asteroid/small body explorer with impactors and a suite of science instruments, and a more typical interplanetary cruise vehicle delivering a science payload to a planet for orbit, entry, or landing.