SPHERES: FROM GROUND DEVELOPMENT TO OPERATIONS ON ISS

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ABSTRACT
SPHERES (Synchronized Position Hold Engage and Reorient Experimental Satellites) is an internal International Space Station (ISS) Facility that supports multiple investigations for the development of multi-spacecraft and robotic control algorithms. The SPHERES Facility on ISS is managed and operated by the SPHERES National Lab Facility at NASA Ames Research Center (ARC) at Moffett Field California. The SPHERES Facility on ISS consists of three self-contained eight-inch diameter free-floating satellites which perform the various flight algorithms and serve as a platform to support the integration of experimental hardware. To help make science a reality on the ISS, the SPHERES ARC team supports a Guest Scientist Program (GSP). This program allows anyone with new science the possibility to interface with the SPHERES team and hardware. In addition to highlighting the available SPHERES hardware on ISS and on the ground, this presentation will also highlight ground support, facilities, and resources available to guest researchers.

Investigations on the ISS evolve through four main phases: Strategic, Tactical, Operations, and Post Operations. The Strategic Phase encompasses early planning beginning with initial contact by the Principle Investigator (PI) and the SPHERES program who may work with the PI to assess what assistance the PI may need. Once the basic parameters are understood, the investigation moves to the Tactical Phase which involves more detailed planning, development, and testing. Depending on the nature of the investigation, the tactical phase may be split into the Lab Tactical Phase or the ISS Tactical Phase due to the difference in requirements for the two destinations. The Operations Phase is when the actual science is performed; this can be either in the lab, or on the ISS. The Post Operations Phase encompasses data analysis and distribution, and generation of summary status and reports.

The SPHERES Operations and Engineering teams at ARC is composed of experts who can guide the Payload Developer (PD) and Principle Investigator (PI) in reaching critical milestones to make their science a reality using the SPHERES platform. From performing integrated safety and verification assessments, to assisting in developing crew procedures and operations products, to organizing, planning, and executing all test sessions, to helping manage data products, the SPHERES team at ARC is available to support microgravity research with the SPEHRES Guest Scientist Program.