

19th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND  
DEVELOPMENT (D3)

Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Technologies  
(2B)

Author: Dr. Jeffery Greenblatt  
United States, jgreenblatt@orbitalassembly.com

GRAVITY RING: AN UNCREWED ROTATING ARTIFICIAL GRAVITY RESEARCH AND  
OPERATIONS PLATFORMS

**Abstract**

Long-duration human spaceflight will require effective countermeasures for weightlessness as well as space radiation to maintain lifelong health of the astronauts. Among the many proposed solutions considered for alleviating the worst physiological effects of microgravity are centrifugation, specifically at low rotational speeds (less than 2 rpm) to minimize cross-coupling and Coriolis effects. Orbital Assembly Corporation is currently developing a prototype testbed and research platform called Gravity Ring, to be privately funded and deployed in low Earth orbit, that will be capable of producing up to Mars-level artificial gravity through rotation. This ring-shaped spacecraft will be assembled from modular components in orbit via a second spacecraft called the Prototype Structural Truss Assembly Robot (PSTAR) also in development. Once assembled, Gravity Ring will measure 60 m in diameter, with a 2 m by 2 m square toroidal cross-section. In addition to containing solar power/battery modules, propulsion modules, avionics, communications equipment, cameras, and diagnostic equipment, the Gravity Ring will have the capacity to fly several guest payloads of up to 200 kg each and 0.9 m<sup>3</sup> volume that cannot take advantage of the partial gravity environment to perform vital measurements or experiments. While not contained ECLSS systems supporting microbial, plant, or small animal experiments for a period of several days to months. Gr