MAGNETIC LEVITATION BASED MARTIAN AND LUNAR GRAVITY SIMULATOR

J.M. Valles, Jr., H.J. Maris, G.M. Seidel, J. Tang, W. Yao

Department of Physics, Brown University, Providence, Rhode Island 02912 USA
(valles@physics.brown.edu/Fax:1-401-863-2024)

Missions to Mars will subject living specimens to a range of low gravity environments. Deleterious biological effects of prolonged exposure to Martian gravity (0.38 g), Lunar gravity (0.17 g), and microgravity are expected, but the mechanisms involved and potential for remedies are unknown. We are proposing the development of a facility that provides a simulated Martian and Lunar gravity environment for experiments on biological systems in a well controlled laboratory setting. The magnetic adjustable gravity simulator (MAGS) will employ intense, inhomogeneous magnetic fields to exert magnetic body forces that oppose the body force of gravity on a specimen. By adjusting the magnetic field, it is possible to continuously vary (increase or reduce) the total body force acting on a specimen. This technique has been used to levitate a range of organisms in ground-based experiments. The simulator system considered here will consist of a superconducting solenoid with a room temperature bore that such that the available sample space will be sufficient to accommodate small whole organisms, cell cultures, and gravity sensitive bio-molecular solutions. It will have good optical access so that the organisms can be viewed in situ. This facility will be valuable for experimental observations and public demonstrations of systems in simulated reduced gravity.