**Brains in Space – Effects of Extreme Environments on Brain Plasticity and Spatial Cognition**

Physical and social environments are key to physiological and behavioral plasticity across species. Extreme environmental conditions can dampen this response, and even have a detrimental effect. Empirical evidence from animal studies shows that social isolation, immobilization, and altered gravity can have profound effects on brain plasticity, and particularly brain areas associated with spatial cognition. Whether these effects translate to humans is not well understood. In this talk, I will argue that spaceflight research in humans provides unique opportunities to gain new insights into the role of experiential diversity on brain and spatial cognition. I will show how acute exposure to varying gravity levels, spaceflight, long-duration bed rest, social isolation, and Antarctic expeditions can affect brain plasticity and spatial abilities, and how we can utilize these settings to develop new approaches to mitigate potential adverse neurobehavioral effects associated with such extreme conditions.