

DAGSI Research Topic Template

1. **Research Title:** The effect of reduced gravity on the gut microbiome and its interaction with the host

2. **Individual Sponsor:**
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3. **Academic Area/Field and Education Level**
Microbial Ecology/Microbiology/Bioinformatics
MS or PHD level

4. **Objectives:** Enables current and future SPACE FORCE/AIR FORCE mission analysis and predictivity for sustaining/enhancing human performance both from a physical perspective (well-being) but also from a cognitive state

5. **Description:**
Humans have evolved in a microbial world where gravity is an ever-present force. Technology is allowing humans to venture far further than was imaginable even 100 years ago. As such, technology is increasing the rate of change that humans need to adapt to. Spaceflight takes humans out of the reach of Earth's gravitational pull. Understanding how this change affects our physiology and our interactions with our microbes is essential in maintaining a resilient Guardian in space. In this topic, we would like to understand the effect of microgravity on the gut microbiome and investigate the role of any changes on human health and performance. The small amount of research performed in this area suggests that the gut microbiome became more similar across astronauts in space compared to preflight samples and the abundance of 17 genera significantly changed in space. There is strong evidence that microbial metabolites are affected by reduced gravity, and that microbial metabolites affect the physical and mental state of humans. Recruiting participants from the very small number of humans that will be going to space in the next few years is likely to be extremely difficult, so we suggest using in vitro systems as a proxy.

6. **Research Classification/Restrictions:** None

7. **Eligible Research Institutions:** All DAGSI eligible institutions

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