Paper ID: 63229
student

IAF SPACE PROPULSION SYMPOSIUM (C4)
New Missions Enabled by New Propulsion Technology and Systems (9)

Author: Mr. Archit Kalra
United States

A QUARK-GLUON PLASMA-BASED MODEL FOR AN ANTIMATTER ENGINE FOR SPACE PROPULSION

Abstract

Antimatter engines have been widely discussed as one of the new frontiers to explore in pursuit of attaining a rocket that can achieve relativistic speeds. However, the majority of current antimatter-powered engine models rely on large amounts of antimatter for long-distance missions as well as limited methods for its storage, which generally involves ion traps. Here I propose the potential for a quark-gluon plasma (QGP)-based antimatter engine that could resolve some of these issues. Although current attempts at creating QGP in colliders have been fruitful to an extent, creating and storing enough of it to power a deep-space mission is an entirely new task. However, if a sufficient storage trap is created similar to but more efficient than existing ion traps and QGP can be stored, then QGP can be slowly released in small amounts from the trap and allowed to cool, which can cause condensation into matter-antimatter pairs and annihilation. By diverting part of the energy from the annihilation towards rocket thrust and part of it towards maintaining the extremely high temperatures required for QGP to stay in its form, a self-sustaining QGP-based antimatter engine can be created that could achieve relativistic speeds rather easily. I discuss potential solutions that could improve current success rates in QGP synthesis and lifetime in colliders as well as ion trap designs that could successfully store it, and perform calculations that demonstrate the true potential of this design in action.