

**Title:** New Frontier in Space Technology: The Development of Antimatter Propulsion Systems is Necessary to Achieve the Most Effective Source of Fueling Spacecraft

**Presenter:** Faizan Darsot, El Camino College

**Mentor:** Perry Hacking

The cost of production of antimatter particles is high (\$25 billion per gram), but their potential benefits to propulsion systems are equally staggering. Antimatter fuel will enable the exploration of distant planets and the stars beyond. Tara Shears, a particle physicist at the European Organization of Nuclear Research, known as CERN, describes how the universe was formed from the Big Bang when there was an equal amount of matter and antimatter. But when the two particles touch each other they annihilate, and both particles are completely converted to energy in the form of light. We can manipulate all of the energy in return to power rockets. Capturing and storing these particles is difficult. Nonetheless, recent improvements have already been made for designing a capsule at CERN that stores these “exotic” particles (Steigerwald). Joel Fajans, a physicist from the Berkeley Laboratory and the US Department of Energy, describes different ways in which storing antimatter is going to benefit spacecraft design, involving higher payloads and efficiency. NASA Institute for Advanced Concepts (NIAC) emphasizes antimatter-powered spacecraft are far more energy-efficient compared to nuclear-powered, which only converts three percent of their mass into energy. Inventing this propulsion will allow us to push further exploration in interplanetary missions and enhance instruments such as the Alpha Magnetic Spectrometer (AMS). Antimatter Propulsion Systems are worth time and investment because they will enable us to expand our horizons in space and serve as the most powerful source of technology for centuries to come.

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