The Laser's Potential: Photonic Propulsion in the Future of Transportation

Hickenlooper, Benjamin (School: Fremont High School)

Current transportation systems lose efficiency and contribute to greenhouse gas emission. Solutions through photonic propulsion are plausible and testable, but uncertain. Initial experiments tested the ability to measure the force applied by a one-watt, 450 nanometer-wavelength laser. Displacement was detected using a needle and reflector on the arm of the balance with the pages of a textbook as a frame of reference. The consistent results achieved at that stage led to a software design to 3D print a capsule with cooled superconductors which provided levitation over a magnet track. The laser was directed at a low angle of incidence toward the back of the capsule and reflected multiple times with a mirror on the end of the track. The increase in number of reflections perpetuated the amount of kinetic energy absorbed by the capsule. Difficulties with this test resulted from scattering of the beam due to condensation on reflectors and oscillation from air currents. No acceleration was detected from the laser, but the mathematics show that under ideal conditions, there would be measurable movement. Future modes of transportation may rely on photonic propulsion.

Awards Won: