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"The Magnetic Sail"

The magnetic sail (or "magsail") is a concept that propels spacecraft by using the magnetic field generated by a loop of superconducting cable to deflect interplanetary or interstellar plasma winds. Assuming high temperature superconductors with the same current/mass ratio as existing low temperature superconductors, a magsail sailing on the solar wind at a radius of one astronautical unit can attain accelerations on the order of 0.01 m/s^2 -- much greater than that available from a conventional solar lightsail -- and also greater than the acceleration due to the Sun's gravitational attraction. A net tangential force or "lift" can also be generated. Lift to drag ratios of about 0.3 appear attainable. Using these forces, a magsail can transfer payloads to and from any two circular orbits in the solar system in a flight time without the expenditure of propellant. A magsail operating within the magnetosphere could be made to interact usefully with the Earth's magnetic poles to generate large amounts of thrust that can be used in a series of perigee kicks to drive a payload of several times the magsail's mass to interplanetary space in times scales of a few months.