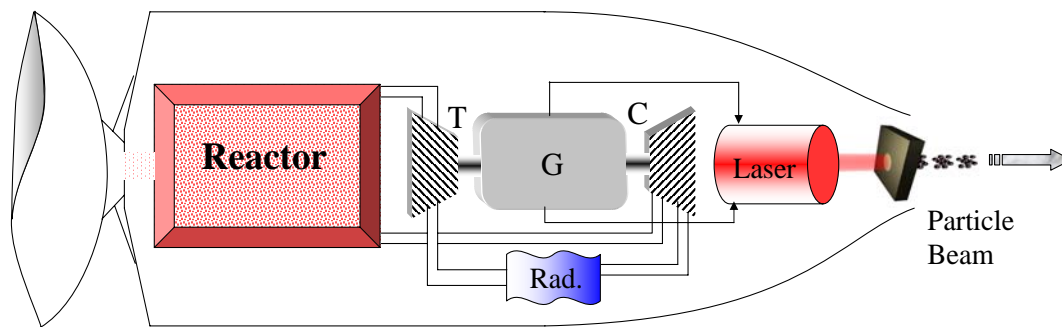


## Ultrafast Laser-Driven Plasma for Space Propulsion

**TERRY KAMMASH**

University of Michigan

Recently conducted experiments at the University of Michigan and elsewhere have shown that ultra short pulse (ultrafast) lasers could accelerate charged particles to relativistic speeds. Current achievable laser peak power of about  $10^{15}$  Watts has been utilized in the study of relativistic nonlinear optics in plasmas, and it is expected that laser power values will be reached in the near future that will accelerate protons to energies equal to their rest mass energy. That readily means that is such particles are ejected from a propulsion system at 0.866 (the speed of light), they will produce a specific impulse of 26 million seconds. Present day experiments have also demonstrated that a beam of MeV protons containing more than  $10^{10}$  particles at 100 MeV energy will indeed be achieved in the not too distant future. Propulsion systems based on such concepts will indeed make distant planets in the solar system, and some interstellar missions, achievable in relatively short times.



Laser-Accelerated Plasma Propulsion System (LAPPS)