Abstract:

To reduce the propellant mass required for a space mission the momentum of the particles ejected from the rocket must be increased beyond what is possible from chemical reactions. For a period of more than 10 years we worked with NASA and Ad Astra Rocket Company on developing the VASIMR concept to something that could be flown on a space mission. In this colloquium I will discuss the basic plasma physics topics we encountered in this adventure. Topics include realization that RLH waves carry power into the helicon plasma, single pass heating with ion cyclotron waves, damping of electromagnetic waves from collisions driven by ion acoustic waves and detachment of the plasma from a confining magnetic field.