From Thermonuclear Fusion to High Power Rocket Propulsion, a Plasma Physics Journey of Challenge and Opportunity

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In the late 1960s controlled thermonuclear fusion became a formidable motivator for advancing the field of plasma physics and fostering the development of technologies such as advanced plasma sources, superconductors, high energy particle beams, high power radio and microwave generators and plasma diagnostics. The field of high-power plasma rockets also gained momentum alongside and benefiting from these advances and the VASIMR® engine was an early product of this scientific bonanza. In this talk I shall present the development of the technology from its historical underpinnings in the 1980s at MIT, through its formative years as a NASA project, to its technological maturation at Ad Astra Rocket Company. I shall discuss the plasma physics foundations of the engine, its present status, major challenges and the company's current plans for full commercial deployment of the technology in support of a rapidly emerging space market and ultimately as a fast transportation option for humans to explore the Solar System.