

22nd IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)  
Strategies for Rapid Implementation of Interstellar Missions: Precursors and Beyond (4)

Author: Mr. Roger X. Lenard  
LPS, United States, rxlenard@gmail.com

ADVANCED CAPABILITIES FOR NUCLEAR ELECTRIC POWERPLANTS FOR INTERSTELLAR  
PRECURSORS

**Abstract**

In recent years there has been a number of advances in fields tangential to, but including nuclear reactors that gives promise to space nuclear electric power systems whose specific mass,  $\approx$  kg/kWe achieving values  $\leq 20$  kg/kWe. Historically, the concept was to have very high temperature reactors, Toutlet, 1300 Kelvins driving relatively inefficient thermoelectric system with high temperature radiators. The concept was that since radiators comprised a relatively large fraction of the systems mass, the radiators should be made as small as possible. The advent of composite materials has ushered in the potential for large, lightweight radiators, which can enable highly efficient systems, generating moderate quantities of electrical power, with low values of power system mass.

Little Prairie Services, LLC has pioneered work in several areas leading to an integrated system with a power system  $\leq 20$  kg/kWe at electrical power levels  $\leq 375$  kWe. The power systems themselves are presently design to operate for  $\leq 5$  full power years, however, we discovered that given the correct conditions, velocity additions  $\geq 100$  km/s were feasible with approximately 1 -2 full power years of thrusting, followed by  $\geq 20$  years operations at  $\leq 10$  kW.

In this paper the author discusses the advances made by LPS in concert with research from other organizations to improve efficiency, power levels, and to minimize system mass with a few examples of potential implications of these advances. The technologies are all quite advanced in development status, but have not been integrated in this fashion before.