

**Outer Planet Science Missions enabled by Solar Power.** K. Klaus, D. B. Smith, and M. S. Kaplan, The Boeing Company, 13100 Space Center Blvd, Houston, TX, 77059, ([kurt.k.klaus@boeing.com](mailto:kurt.k.klaus@boeing.com), [david.b.smith8@boeing.com](mailto:david.b.smith8@boeing.com), [michael.s.kaplan@boeing.com](mailto:michael.s.kaplan@boeing.com)).

**Introduction:** Our studies demonstrate that New Frontiers-class science missions to the Jupiter and Saturn systems are possible with commercial solar powered space craft. These spacecraft are flight proven with more than 60 years of in-space operation and are equipped with highly efficient solar arrays capable of up to 25kW in low earth orbit. Such a vehicle could generate nearly 1kW in the Jovian System. Our analysis shows substantially greater power at the end of mission with this solar array system than the system that is planned for use in the Europa Jupiter System Flagship mission study.

In the next few years, a new solar array technology will be developed and demonstrated by DARPA that will provide even higher power. DARPA's Fast Access Space Testbed (FAST) program objective is to develop a revolutionary approach to spacecraft high power generation. This high power generation Subsystem, when combined with electric propulsion, will form the technological basis for a light weight, high power, highly mobile spacecraft platform. The FAST program will demonstrate the implementation of solar concentrators and high flux solar cells in conjunction with high specific impulse electric propulsion, to produce a high performance, lightweight power and propulsion system.

A basic FAST spacecraft design provides about 60 kW in LEO, which scales to > 2 kW at 5 AU, or a little less than 1 kW at 10 AU. In principle, higher power levels (120 kW or even 180kW at 1 AU) could be accommodated with this technology. We envision missions using this FAST array and NASA's NEXT engines for solar electric propulsion (SEP) Jovian and Saturn system maneuvers. We envision FAST arrays to cost in the tens of millions, making this an affordable, plutonium-free way to do outer planets science. Continued funding will mean flight experiments conducted in the 2012 timeframe that could make this technology flight proven for the New Frontiers 4 opportunity.