

Abstract Submitted  
for the DPP10 Meeting of  
The American Physical Society

**Near Term Fission-Fusion Hybrids- Advantages for Fission and Fusion** M. KOTSCHENREUTHER, S. MAHAJAN, P. VALANJU, University of Texas — Fission-fusion hybrids are described with unique advantages relative to fission only systems, for different missions. Innovative designs allow hybrids to incinerate waste, or produce fuel, with far fewer hybrids than would be possible with fission-only fast reactors. In addition, hybrids can perform these missions while addressing concerns regarding proliferation, by using unique fuel cycles, not accessible to fission alone, that use no reprocessing, or greatly reduced reprocessing. These goals can be achieved using fusion devices in the range considered for fusion Component Test Facilities (CTF). The fusion physics and fusion engineering performance necessary for these missions is far less stringent than for a pure fusion power reactor. Unique designs aspects substantially separate the fission and fusion aspects, allowing much more independent development of each. Hence, a suitable hybrid can provide a nearer term, lower risk, application for fusion, and be an additional incentive to implement a fusion CTF device. The fuel cycle possibilities above are verified using Monte-Carlo neutron calculations. Fusion neutron sources with high power densities and modest power levels are sufficient and necessary.

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Date submitted: 20 Jul 2010

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