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Nasa's New Millennium ST8 Project

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NASA's New Millennium Program (NMP) is formulating the Space Technology 8 (ST8) subsystem demonstration mission, which will qualify, on a single spacecraft provided by Orbital Sciences Corporation, four technologies: Thermal Loop, a miniature loop heat pipe system with multiple evaporators; SAILMAST, a gossamer mast; UltraFlex-175, an ultra-lightweight, deployable solar array; and Dependable Multiprocessor, a fault-tolerant COTS processor for onboard science computing. These technologies have been identified by NMP, with input from the space science community, as necessary to enable future NASA space science missions. Examples of previous enabling technologies demonstrated by NMP are the ion engines on Deep Space 1 and the Autonomous Sciencecraft Experiment demonstrated by ST6. The Thermal Loop, provided by NASA's Goddard Space Flight Center will demonstrate that a loop heat pipe with multiple evaporators and condensers can transport large heat loads over long distances without external pumping. It is expected that this technology will enable more precise temperature control decreasing the mass, power, and volume of small remote sensing and surface-based spacecraft. The SAILMAST experiment is a deployable gossamer mast technology, which will validate its load-carrying characteristics by correlating in-flight measurements with analytical predictions. It will enable a new class of missions, which employ solar sail propulsion technology. The UltraFlex-175 will demonstrate the next generation in ultra-lightweight fan-folded flexible solar arrays, providing ultra-high specific power (170-220 W/kg BOL), ultra-compact stowage volume (>33 W/m3), and high deployed stiffness. The result is less mass and volume needed for power generation on future spacecraft. The Dependable Multiprocessor will integrate commercial-off-the-shelf (COTS) processing components and fault-tolerant control algorithms to provide an adaptable, high-performance, on-board science processing platform. It is expected that this experiment will enable more capable, high performance, fault-tolerant, processing to handle, in a variety of planetary and deep space environments, the large science and autonomy data processing loads expected in the future. This work done at JPL under contract with NASA.