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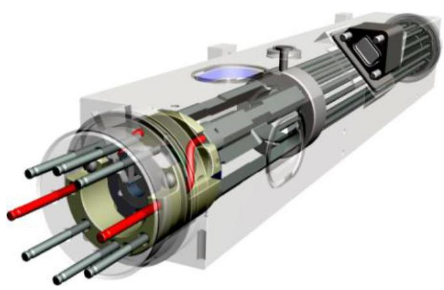

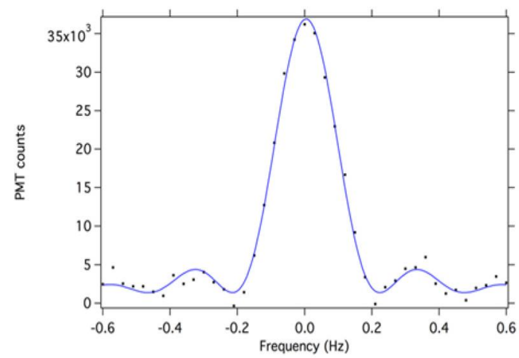

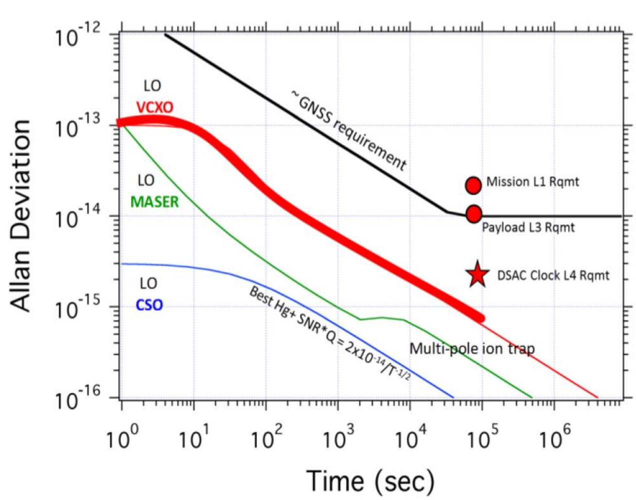

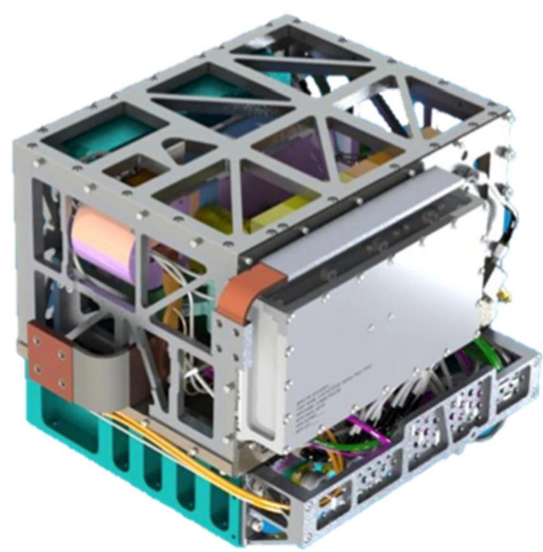

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Mercury Ion Clock for a NASA Technology Demonstration Mission

The Deep Space Atomic Clock (DSAC) mission is a spaceflight demonstration experiment to operate a new type of atomic clock in Earth orbit. The experimental clock is based on the 40.5-GHz ground state hyperfine transition of Mercury 199 ions confined near room temperature in either a quadrupole or multipole linear ion trap. Atomic state selection is accomplished via optical pumping with a Mercury 202 discharge lamp. The cover figures show a) the quadrupole and multipole ion trap assemblies, b) the 40.5-GHz ion clock signal, c) the fractional frequency stability of trapped ion based frequency standard implementations and the DSAC demonstration goals, and d) the complete DSAC ion clock assembly with the outer magnetic shield removed.

Images are courtesy of Robert L. Tjoelker, John D. Prestage, Eric A. Burt, Pin Chen, Yong J. Chong, Sang K. Chung, William Diener, Todd Ely, Daphna G. Enzer, Hadi Mojaradi, Clay Okino, Mike Pauken, David Robison, Bradford L. Swenson, Blake Tucker, and Rabi Wang. The authors are with the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109 USA.

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