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A low-orbit, science mission to Jupiter

C. Bombardelli (1), J.R. Sanmartin (1) , A. Sanchez-Torres (1) , M. Charro (1), and E.C. Lorenzini (2)

(1) Universidad Politécnica de Madrid, Madrid, Spain, juanr.sanmartin@upm.es / Fax: +34-91-3366303) (2) Universitá di Padova, Padova, Italy

Abstract

A final-stage mission to Jupiter with a spacecraft starting in circular, equatorial orbit safe below the Radiation Belts, at radius 1.3 – 1.4 times the Jovian radius, is considered. A light, few kilometers long, thin tape bare-tether could make the spacecraft spiral in over several months, in a controlled manner, while generating power onboard. A number of possible scientific goals is discussed. The initial location at the inner region of the *Halo* ring and the strong 2:1 Lorentz resonance would allow *in situ* measurements on charged grains. From its slowly decaying orbit the spacecraft could carry out spatially resolved observations as required for understanding transport in the atmosphere, and broad studies on its variability over different time scales. The proximity to Jupiter would allow highly accurate determination of magnetic and gravity fields, and interior water content. With the tether spinning in the orbital plane to keep taut, it would be half the time electrically floating and biased highly negative, thus emitting a beam of secondary electrons from the impact of attracted ions; this would result in multiple magnetic mirroring in the near, longitude-dependent, multipole field and eventually in auroral emissions, throughout the spacecraft decay.