

SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration (6)

Author: Dr. Yanping Guo

The John Hopkins University Applied Physics Laboratory, United States, yanping.guo@jhuapl.edu

SOLAR PROBE PLUS: MISSION DESIGN CHALLENGES AND TRADES

Abstract

NASA plans to launch the first mission to the Sun, named Solar Probe Plus, as early as 2015, after a comprehensive feasibility study that significantly changed the original Solar Probe mission concept. The original Solar Probe mission concept based on a Jupiter gravity assist trajectory was no longer feasible under new guidelines given to the mission. A complete redesign of the mission was required in order to meet the mission constraints, which called for the development of alternative mission trajectories that excluded Jupiter's flyby. The redesign had to determine how close to the Sun can Solar Probe get without the very powerful gravity assist of Jupiter. Mission design has become one of the major aspects as well as a key enabler to this highly challenging mission. A review of the mission design requirements and challenges will be presented, along with the design trades considered in the study. Various mission scenarios and different trajectory options utilizing various planetary gravity assists will be discussed.