



SEMINAR 專題演講



國立中央大學 太空科學與工程學系

Department of Space Science and Engineering, National Central University

Time

Wednesday,
September 4, 2024
15:00 – 16:00

From Decadal Survey to Space Missions: Solar Wind to Local Interstellar Medium

Place

健雄館(科四館)

S4-917 教室
Room S4-917,
Chien-Shiung Building

Mitchell M. Shen

Associate Research Scholar, Department of Astrophysical Sciences, Princeton University, USA

Abstract

Parker Solar Probe (PSP), a NASA mission launched in 2018, is designed to study the outer corona of the Sun. PSP will approach within 9.86 solar radii of the Sun and, by 2025, is expected to reach speeds of up to 191 km/s, making it the fastest human-made object ever. The mission's primary objectives are to: 1) trace the flow of energy that heats the solar corona and accelerates the solar wind; 2) determine the structure and dynamics of the plasma and magnetic fields at the sources of the solar wind; and 3) explore mechanisms that accelerate and transport energetic particles. Another significant mission, the Interstellar Mapping and Acceleration Probe (IMAP), scheduled to launch in the summer of 2025, will explore two interconnected Heliophysics topics: the acceleration of energetic particles and the interaction between the solar wind and the local interstellar medium. These topics are linked because particles accelerated within the inner heliosphere are vital to the outer heliospheric interactions. IMAP will also continuously broadcast real-time in-situ data that can be used for space weather prediction. The speaker has involved in the data analysis of PSP mission in collaboration with Solar Orbiter (led by ESA) and served a key role in IMAP-Lo and SWAPI (Solar Wind and Pickup Ions) instrument developments on IMAP. This talk will introduce i) overarching science questions, ii) scope of planned science, and iii) incubation from decadal survey to missions.

Bio

Dr. Shen is a scientist specializing in space plasma, cosmic dust, and energetic particles. He earned his B.S. and M.S. in Aeronautics and Astronautics from National Cheng Kung University and a Ph.D. in Aerospace Engineering Sciences from the University of Colorado Boulder. His Ph.D. dissertation focused on dust detection via electric field antenna instruments. He developed an electrostatic model to better interpret waveform signals from dust impacts, aiding in characterizing dust distributions and populations in the solar system. His master's thesis involved developing an electron cyclotron resonance ion thruster from scratch in Taiwan. Before his doctoral studies, he expanded his research to space weather, explicitly traveling ionospheric disturbances and magnetosphere-ionosphere-thermosphere coupling. Dr. Shen is an Associate Research Scholar in Astrophysical Sciences at Princeton University. His work at Princeton includes (1) developing and calibrating the IMAP-Lo & SWAPI instruments for the IMAP mission, (2) studying energetic particles, radio bursts, and dust with the IS \odot IS and FIELDS instrument onboard the Parker Solar Probe, and (3) characterizing dust environments using data from Juno/Waves and SoHO/RPW.