



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

Friday, June 5, 2026
14:00 – 15:30

Multiscale Kinetic Modeling of Solar Wind–Magnetosphere–Ionosphere Interactions

Place

健雄館 (科四館)

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

Prof. Yu Lin

Physics Department, Auburn University, USA
Alumni Professor

Particle kinetic processes play key roles in solar wind–magnetosphere energy transport and are central to understanding space weather phenomena. On one hand, the characteristic scale lengths of the bow shock and magnetospheric boundary layers, where essential transport takes place, are of particle kinetic scales, and explosive instabilities are observed to occur in thin current sheets under the solar wind and global-scale driving conditions. In such processes, structures and waves of length scales comparable to the particle Larmor radius are of particular importance because they provide efficient heating and acceleration through wave-particle interactions. On the other hand, the local instabilities can lead to changes in the global magnetic field configuration, and their dynamics are regulated by the system conditions. It is desirable to solve the physics of the global magnetosphere by computations that include both global and particle scales.

In this talk, I will discuss global ion kinetic computations of the coupling between the solar wind and the magnetosphere based on hybrid simulations using the Auburn Global Hybrid Code in 3D (ANGIE3D). I will first introduce the simulation model and discuss the code validation as well as its capability to study major space weather plasma processes. The talk will then focus on simulations of a few dayside/nightside plasma processes, including the global impacts of interplanetary discontinuities, magnetopause reconnection and its subsequent wave/particle injection in the cusp ionosphere, and transport due to storm-time magnetotail bursty bulk flows.