

Department of Physics Colloquium

Wednesday, February 12th at 4:00 p.m. / SH 121

Pre-Colloquium at 3:30 p.m. / SH 108

Thermospheric and Ionospheric Data Assimilation for Current and Future Satellite Missions

Speaker: Dr. Chih-Ting Hsu

Abstract:

With the rapid expansion of the aerospace industry, the demand for practical space weather forecasting has become increasingly urgent. A key technique in numerical space weather prediction is data assimilation, which optimally integrates observational data with model simulations to improve initial conditions and refine model parameters, ultimately enhancing forecast accuracy.

In this presentation, we will provide a brief introduction to the concept of data assimilation, explaining how it bridges the gap between real-world observations and model predictions. We will particularly focus on ensemble-based data assimilation methods and their potential applications in the thermosphere and ionosphere, where complex electrodynamic phenomena happen.

Furthermore, we will present several examples demonstrating the assimilation of satellite measurements into numerical models of the upper atmosphere. These case studies will demonstrate the practical benefits of data assimilation, showcasing how it helps refine our understanding of space physics and improves the accuracy of weather predictions for the thermosphere and ionosphere.