KOTAK SCHOOL OF SUSTAINABILITY

Indian Institute of Technology Kanpur

Swastibhavatu Lecture Series

(Distinguished Lecture Series in Sustainability)
Supported by the Rawat Family Trust

Title: First Principles, Fast Algorithms: The Physics-AI Synthesis in Earth System Modeling

Date: 15 September, 2026
Time: 5:00 – 6:00 PM
Venue: L16, LHC IIT Kanpur

Speaker

Tapio Schneider

THEODORE Y. WU PROFESSOR OF ENVIRONMENTAL SCIENCE & ENGINEERING
California Institute of Technology (Caltech)

Context

While climate change is certain, precisely how climate will change is less clear. Breakthroughs in the accuracy of climate projections and the quantification of their uncertainties are now within reach, driven by advances in computational and data sciences and the availability of Earth observations from space and from the ground.

The talk will survey the design of a new Earth system model (ESM) developed by the Climate Modeling Alliance (CliMA), which is performance-portable across modern computing architectures and can deliver predictions from days to decades.

It will cover how machine learning (ML) can inform physics-based models with heterogeneous and noisy data, and how substantial increases in the accuracy of simulations of uncertain processes can be achieved.

About The Speaker

Tapio Schneider is a Professor at Caltech and Principal Scientist at Google. He has shown how rainfall extremes intensify as Earth warms, how changes in cloud cover can destabilize the climate system, and how winds and weather on other planetary bodies (e.g., Jupiter and Titan) come about. He is leading the Climate Modeling Alliance, whose mission is to build the first climate model that automatically learns from data to produce accurate climate predictions.

Key Takeaways

Advancing the accuracy of climate projections

A new Earthsystem model(ESM) developed by the CliMA

Integrating machine learning with physics-based models

Improving the accuracy of simulations of uncertain climate processes

High Tea at 4:45 PM