

## **Abstract**

Oberwolfach Workshop:

### **Mathematical Advances in Geophysical Fluid Dynamics**

Dates:

**11 May - 16 May 2025** (Code: 2520)

Organizers:

**Anne-Laure Dalibard, Paris**

**Peter Korn, Hamburg**

**Leslie M. Smith, Madison**

**Edriss S. Titi, Cambridge UK/College Station/Rehovot**

This workshop focuses on the mathematical study and analysis of geophysical models. In particular it aims to address recent advances and developments in analytical, computational and stochastic studies of geophysical fluid models.

This field has seen tremendous scientific activities and broad impact in the last years, which are mainly due to the facts that, on the one hand, the underlying governing equations have a very complex structure, and a wide spectrum of active spatial and temporal scales, and on the other hand these equations form a fundamental building block in climate models for the Planet Earth. As in the case of the Navier-Stokes equations, many of these systems still lack, however, basic understanding concerning global existence and uniqueness of smooth solutions. In oceanic and atmospheric dynamics, and also in the theory of boundary layers, one is hence often investigating reduced or simplified models, whose derivations are based on formal asymptotic procedures, some of which are not systematic and calling for rigorous validation at the relevant temporal and spatial scales. These simplified models bring up difficult analytical, numerical and physical questions concerning well-posedness, validity, stability and numerical approximations of these models.