

SEMINAR OF ANALYSIS

FRIDAY 19 November 2021 - Room: MA B1 11 at 2.15 pm

Prof. Gian Michele GRAF (ETH - CH)

will present a seminar entitled:

« Topology in shallow-water waves: A violation of bulk-edge correspondence »

Abstract:

Topological matter is seen to enjoy a remarkable duality, no matter the specific instance or model being considered, namely bulk-edge correspondence: The homotopy class characterizing the extended material is reflected in a matching property of the excitations running along its boundary. After reviewing the correspondence, we will address a counterexample. A two-dimensional rotating shallow-water model describes a layer of water, in guise of oceans covering the Earth. Its mathematical description parallels that of a band insulator, except for the energy range of a band being unbounded. Once regularized at small scale by an odd-viscous term, such a model has a well-defined bulk topological index. However, in presence of a sharp boundary, the number of edge modes depends on the boundary condition, showing an explicit violation of the bulk-edge correspondence. We study a continuous family of boundary conditions with a varied phase diagram, and explain the origin of this mismatch. Our approach relies on scattering theory and Levinson's theorem. The latter does not apply at infinite momentum because of the analytic structure of the scattering amplitude there, which is ultimately the reason for the violation.

(Joint work with H. Jud and C. Tauber.)

Lausanne, November 10, 2021

JK/rb

Seminars are announced on the Mathematics Section website: <http://memento.epfl.ch/maths/>