ESI Erwin Schrödinger International Institute for Mathematics and Physics

universität wien

DVR 0065528

Seminar

Prof. Detlev BUCHHOLZ

University of Göttingen

Classical dynamics, arrow of time, and the origin of Heisenberg's commutation relations

Tuesday, October 12, 2021

at 14:00 h

ESI, Boltzmann Lecture Hall

Abstract: Based on the assumption that mechanical systems can be described by Lagrangians and time progresses in a fixed direction, a dynamical C*-algebra is presented for nonrelativistic particles at atomic scales. This algebra is based on the concept of operations and relies exclusively on classical concepts. Nevertheless, it is inherently non-commutative. Without presupposing any quantization scheme, the Heisenberg commutation relations for position and velocity measurements are derived from it. Hilbert space representations of the algebra lead to the conventional framework of quantum mechanics, providing a new look on its foundations. (Joint work with Klaus Fredenhagen).

J. Yngvason

October 4, 2021