Boğaziçi Math Seminar

Classical Dynamics of Infinite Particle Systems in an Operator Algebraic Framework

Christiaan van de Ven

University of Würzburg

Abstract:

In this seminar I present a study on the dynamics of classical infinite particle systems describing harmonic oscillators interacting with arbitrarily many neighbors on lattices, as well on more general structures; and I show that this enables the construction of C*-dynamical systems. This approach allows particles with varying masses, varying frequencies, irregularly placed lattice sites and varying interactions subject to a simple summability constraint. A key role is played by the commutative resolvent algebra, which is a C*-algebra of bounded continuous functions on an infinite dimensional vector space, and in a strong sense the classical limit of the Buchholz–Grundling resolvent algebra, which suggests that quantum analogs of our results are likely to exist. I show why the commutative resolvent algebra is perfectly suited to model classical dynamical systems on an infinite lattice. For a general class of Hamiltonian dynamics, it is demonstrated that this algebra is time-stable, and admits a time-stable sub-algebra on which the dynamics is strongly continuous, therefore obtaining a C*-dynamical system.

Date : Wednesday, October 11, 2023
Time: 13:30
Place: TB 130, Boğaziçi University