

# Mathematical Methods in Quantum Mechanics

Lecturers: A. Teta, G. Panati, and D. Monaco.

The reading course has a tripartite structure. The first part aims at providing some elements of Operator Theory, at the basis of Quantum Mechanics. The second and the third parts are related to specific topics in Quantum Mechanics.

The first part of the reading course concerns the study of linear operators defined on a Hilbert space (the algebra of bounded operators, compact operators, unbounded operators, spectrum and resolvent of an operator, perturbations of a self-adjoint operator), the study of symmetric operators and their extensions (the method of the Cayley transform, differential operators with constant coefficients, Schrödinger operators), the study of the Spectral Theory of self-adjoint operators (Stieltjes measures, spectral measures, spectral parts of a self-adjoint operator, the spectral theorem).

The second part of the reading course concerns the study of periodic Schrödinger operators, which are fundamental in several applications to Solid State Physics.

The third part of the reading course concerns the study of contact interactions, including point interactions as a prototype case.