MP 1: Quantum Mechanics

Zeit: Dienstag 8:30–9:20 Raum: JUR H

MP 1.1 Di 8:30 JUR H

Linear phase-space representations of quantum mechanics with minimal uncertainty in position — •Edmund Menge[1] and Hajo Leschke[2] — [1]Uni Mainz — [2]Uni Erlangen

Quantum mechanics with a non-zero uncertainty in position can be generated by a one-parameter generalisation of the canonical commutation relation of ordinary quantum mechanics. This generalisation may be, for example, used in "Quantum Loop Gravity". For such a quantum mechanics with non-zero uncertainty in position a class of linear phase-space representations is defined, covering the well known phase space representation of Weyl, Wigner and Moyal as a limiting case. Applying the Lie-Trotter formula, these representations lead to a transcription of the new Schrödinger-Semigroup as a sequence of finite-dimensional integrals. These integrals can be informally be interpreted as a phase-space path integral.

MP 1.2 Di 8:55 JUR H

Lower bounds for atomic ground state energies via the Feynman-Kac formula — •Hans Konrad Knörr[1] and Hajo Leschke[2] — [1]Universität Mainz, Germany — [2]Universität Erlangen, Germany

We consider a system of an atomic nucleus and electrons which are coupled by a pure Coulomb interaction. The ground state energy of this system can be calculated as a low temperature limit of a term that is written as a (conditioned) Wiener integral via the Feynman-Kac formula. Using this as a starting point we follow an idea of A. Debiard and B. Gaveau (Math. Phys. An. Geom. 3, 91-100 (2000)) to derive a lower bound to the energy spectrum. The supremum of the integrand of the Wiener intergral can be estimated by applying some methods from Stochastic Analysis, e.g. the Birkhoff-Chintchine ergodic theorem. The obtained lower bound to the ground state energy is very precise for small electron numbers.