Hydrodynamic Closures for Quantum Kinetic Equations

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The goal of quantum-hydrodynamic modeling is to derive quantum mechanical corrections to classical fluid equations via moment closures of the underlying quantum kinetic equation, i.e. the von Neumann equation for the density matrix or the Wigner equation for the Wigner function. These closures are obtained via assumptions on the phase distribution of the wave functions or from thermodynamic principles. One of the main problems with all these approaches is that the collision terms in the quantum kinetic equation is usually not very well understood. In this talk we give an overview over recent developments in the derivation of quantum kinetic collision terms and the resulting closure procedures.