

On the moment problem for quantum hydrodynamics

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We address the following inverse problem in quantum statistical physics: does the quantum free energy (von Neumann entropy + kinetic energy) admit a unique minimizer among the density operators having a given local density $n(x)$? We give a positive answer in various configurations and characterize the minimizer in dimension one. The problem is related to a recent theory developed by P. Degond and C. Ringhofer concerning the derivation of quantum hydrodynamics models. This is jointwork with F. Mehats.