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Atomism and Quantization

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Abstract. I present a novel approach to understanding the mean-field limit of quantum many-body systems, in particular of atomic Bose gases. An Egorov-type theorem relates the quantum dynamics to the dynamics in the mean-field limit, which is given by a Hartree equation. In the mean-field limit, matter is described as a continuum field theory. I show how, starting from certain Hamiltonian continuum theories of matter, the passage to an atomistic description of matter can be understood as a (deformation) quantization. I then discuss some applications of the mean-field description of quantum many-body systems to the physics of stars. In particular, I will describe some recent results on stellar collapse.