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Auxiliary Field Diffusion Monte Carlo for nuclei and nuclear matter.[1]

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Quantum Monte Carlo methods have become a mainstream tool for understanding many-body quantum systems. The nuclear Hamiltonian with its strong spin-isospin dependence presents some special difficulties. I will describe the Auxiliary Field Diffusion Monte Carlo method which combines diffusion Monte Carlo sampling of the spatial positions of the nucleons along with an auxiliary field breakup that simplifies the sampling of the spin-isospin degrees of freedom. Results for nuclei, nuclear and neutron matter will be shown. The current state of the calculations, the approximations being made, and future prospects will be discussed.