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## From ground state energies towards excitations for extended quantum systems

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Iterated backflow and neural network wave functions indicate a systematic way to improve the accuracy of quantum Monte Carlo (QMC) calculations of ground state energies of large (but finite) quantum systems in two or three spatial dimensions at zero temperature. I will illustrate recent improvements on the calculations of the ground state phase diagram of the electron gas and of the phase transition from liquid to solid helium. Then I will discuss the difficulties one faces when extending QMC calculations to study excitation properties of bulk materials, e.g. electronic band gaps in solid hydrogen and the effective mass of the electron gas.

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