Simulating chemistry on bosonic quantum devices

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Resumen

Bosonic quantum devices offer a novel approach to realize quantum computations, where the quantum two-level system (qubit) is replaced with the quantum (an)harmonic oscillator (qumode) as the fundamental building block of the quantum simulator. The simulation of chemical structure and dynamics can then be achieved by representing or mapping the system Hamiltonians in terms of bosonic operators. In this talk, we review recent progress and future potential of using bosonic quantum devices for addressing a wide range of challenging chemical problems, including the calculation of molecular vibronic spectra, the simulation of gas-phase and solution-phase adiabatic and nonadiabatic chemical dynamics, the efficient solution of molecular graph theory problems, mand the calculations of electronic structure.