Real Time Dynamics Simulation of Pure and Doped Helium Nanodroplets using ^{4}He-TDDFT

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The time-dependent dynamics of doped or pure helium nanodroplets poses numerous challenges due to the highly quantum nature of this unusual "solvent" and to its eminent superfluid properties. Helium Time-dependent Density Functional Theory (^{4}He-TDDFT), which describes the time evolution of the helium density rather than that of the many-body wave function, results from a compromise between accuracy and feasibility. It has emerged as a powerful tool to simulate and help understand many experimental results over the years.[1]

In this Introductory Lecture the method will be presented, focusing on its recent and future applications in our groups. These include

- Nanodroplet collisions as a possible alternative mechanism to nucleate vortices[2]
- A direct view on time-dependent ion solvation[3, 4]
- Coulomb explosion of dialkali molecules on the droplet surface
- Pickup and clustering inside helium droplets[5]

References

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