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Coherent boson dynamics in strongly localized potentials - helium excitations at planar aromatic molecules and trapped cold atoms

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Planar aromatic molecules provide strongly localizing potentials for helium that considerably modify the local superfluid properties of a solvating helium environment. I shall describe some of the effects of these interactions on the solvation structure and spectroscopy of tetracene and phthalocyanine in helium droplets, comparing results of zero and finite temperature quantum Monte Carlo simulations with experimental data. The helium atoms closest to the molecule are seen to show similarities to trapped cold atoms in multi-well potentials. Studies of cold bosons with attractive and repulsive interactions in double well potentials will also be presented, showing formation of squeezed and quantum superposition states of cold atoms.