

ABSTRACT

This Thesis focuses on the investigation of dark solitons and quantum droplets in systems with competing interactions. The scope of the studies is narrowed down to quasi-one-dimensional dipolar Bose gases and one-dimensional two-component bosonic mixtures.

The properties of solitons are shown, including their stability and propagation, especially the possibility of a dark soliton-quantum droplet coexistence. A benchmark of the models, which are later used to reveal the presence of ultrawide solitons with peculiar properties and dispersion relation, is done. Furthermore, a connection between the stability and dispersion relation is established.

The theoretical treatment of bosonic gases presented here, offers ground-state energies, chemical potentials, and droplet bulk densities quantitatively agreeing with *ab initio* analytical models or quantum Monte Carlo data.
