

Abstract

The aim of the thesis is to investigate the role of axions and Axion-Like Particles (ALPs) as dark matter candidates and their potential to form Boson Stars. The theoretical framework involves the Gross-Pitaevskii-Poisson Equation, with a focus on numerical methods and the incorporation of self-interaction and angular momentum. Results showcase the effects of self-interaction and angular momentum on Boson Star properties. Detection possibilities, including axion-photon conversion and proximity to high magnetic field structures, are explored. The thesis concludes by proposing future directions, emphasizing the refinement of angular momentum estimates and the need for new analytical solutions to match observed mass-radius relations.

Keywords: Ultralight Bosonic Dark Matter, Boson Stars, Axions