

# The 2024 Chengdu Symposium on Particle Physics and Cosmology: Phase Transitions, Dark Matter and Experimental Probes (CPCS 2024)

Contribution ID: 62

Type: **not specified**

## Simulations of Bosonic Dark Matter

*Monday, 30 September 2024 17:10 (30 minutes)*

This talk discusses simulations of bosonic dark matter, focusing on the condensation and evolution of halos and boson stars, as well as the polarization evolution of vector dark matter.

The background section highlights the nature of cold dark matter, its problems, and possible solutions like warm dark matter, self-interacting dark matter, and ultra-light axions. It introduces axion-like particles and the mathematical framework used to model their behavior.

The first part addresses the formation and evolution of halos and boson stars, with detailed discussion on condensation, growth rates, and the role of self-interaction in shaping these structures. The formation of multiple boson stars due to gravity and self-interactions is also explored.

The second part explores the polarization evolution of vector dark matter. It examines how different initial conditions affect the formation of Proca stars, and how spin and polarization evolve over time. The talk shows that the density of vector dark matter correlates closely with polarization density, and that Proca stars can form due to spin in one direction, leading to a spin reversal in the outer regions.

**Presenter:** 陈, 家骏 (西南大学物理科学与技术学院)