Contribution ID: **385**   Type: **Talk in a parallel session**

Bayesian analysis for rotational curves with l-boson stars as a dark matter component

Tuesday, 9 July 2024 17:25 (20 minutes)

Using Low Brightness Surface Galaxies (LBSG) rotational curves we inferred the free parameters of l-boson stars as a dark matter component. The l-boson stars are numerical solutions to the non-relativistic limit of the Einstein-Klein-Gordon system, the Schrödinger-Poisson (SP) system. These solutions are parametrized by an angular momentum number $l = (N - 1)/2$ and an excitation number n. We perform a bayesian analysis by modifying the SimpleMC code to perform the parameter inference, for the cases with $l = 0$, $l = 1$ and multi-states of l-boson stars. We used the Akaike information criterion (AIC), Bayesian information criterion and the Bayes factor to compare the excited state ($l=1$) and the multi-state case with the ground state ($l=0$) as the base model due to its simplicity. We found that the data in most galaxies in the sample favors the multi-states case and that the scalar field mass tends to be slightly bigger than the ground state case.

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Session Classification: Dark matter halos: its nature, modeling & tracers

Track Classification: Dark Matter (DM): Dark matter halos: its nature, modeling & tracers