

A Supersonically expanding BEC: An expanding universe in the lab

Friday, 21 February 2020 09:00 (30 minutes)

The massive scale of the universe makes the experimental study of cosmological inflation difficult. This has led to an interest in developing analogous systems using table top experiments. One possible system for such simulations is an expanding atomic quantum gas. In recent experiments, we have modeled the basic features of an expanding universe by drawing parallels with an expanding ring-shaped Bose Einstein Condensate (BEC). The Bose-Einstein condensate can be thought of as a vacuum for phonons, and used in analogy to the quantum field proposed to have driven the expansion of the early universe. Here, while the ring-shaped BEC serves as the background vacuum, the phonons are the analogue to photons in the expanding universe. We have studied the dynamics of a supersonically expanding ringshaped BEC both experimentally and theoretically. I will present our results and discuss prospects for future experiments.

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Session Classification: Morning session