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EINLADUNG

im Rahmen des Seminars für Mathematische Physik

zum Vortrag von

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über

"Is Cosmological Dark Matter a Bose-Einstein Condensate ?"

In the last two decades, several suggestions have appeared in the literature that cold dark matter (CDM) may be in the form of a Bose-Einstein condensate (BEC), including axions and other forms of CDM.
In this talk, I will review the motivation and underlying physics as well as the promises and challenges of this hypothesis.
We shall in particular explore one aspect of the impact of the BEC hypothesis on the structure of galactic halos, namely the effects of the angular momentum that results from tidal torquing during large-scale structure formation. Laboratory BECs are known to develop quantum vortices when rotated with sufficient angular velocity. Vortices could, in principle, then result if the CDM is a BEC. The question of whether an angular velocity sufficient to create vortices occurs in BEC/CDM cosmologies has not yet been answered, however.
We address this point by calculating the critical angular velocity for vortex creation in some simple models of BEC halos and comparing the results with the angular velocity expected from CDM N-body simulations. We show that vortices are favoured in halos which form from strongly-coupled BEC/CDM particles, while this is not the case for axions, which are generally presumed to form a BEC but are effectively non-interacting.

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Ort: Erwin Schrödinger-Hörsaal, Boltzmanngasse 5, 5. Stock

gez.: J. Yngvason