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Growth of Linear Perturbations in a Universe with Superfluid Dark Matter

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The Lambda-Cold Dark Matter (ΛCDM) model agrees with most of the cosmological observations, but has some hindrances from observed data at smaller scales such as galaxies. Recently, Berezhiani and Khoury proposed a new theory involving interacting superfluid dark matter with three model parameters in \cite{khoury2015}, which explains galactic dynamics with great accuracy. In the present work, we study the cosmological behaviour of this model in the linear regime of cosmological perturbations. In particular, we compute both analytically and numerically the matter linear growth factor and obtain new bounds for the model parameters which are significantly stronger than previously found. These new constraints come from the fact that structures within the superfluid dark matter framework grow quicker than in ΛCDM, and quite rapidly when the DM-baryon interactions are strong.
Link to the paper- https://doi.org/10.1088/1475-7516/2020/07/034

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