

Non-linear evolution of hot NEDE in N-body simulations

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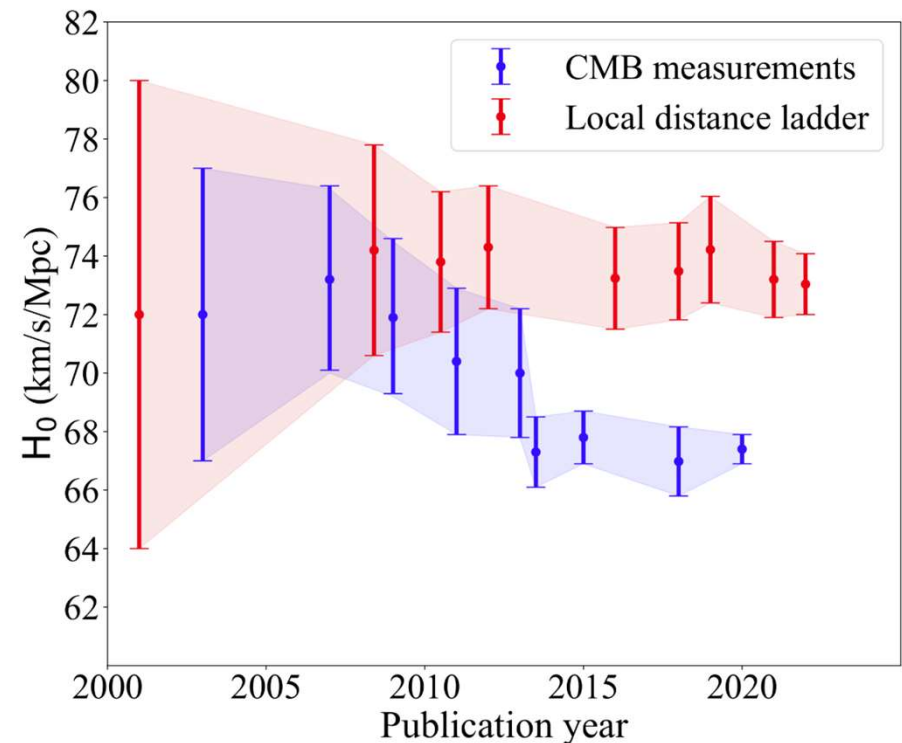
About me

- Focus on computational cosmology
- Bachelor project
 - Constraining $\sum m_\nu$ using Planck data
- Went to QU summer school



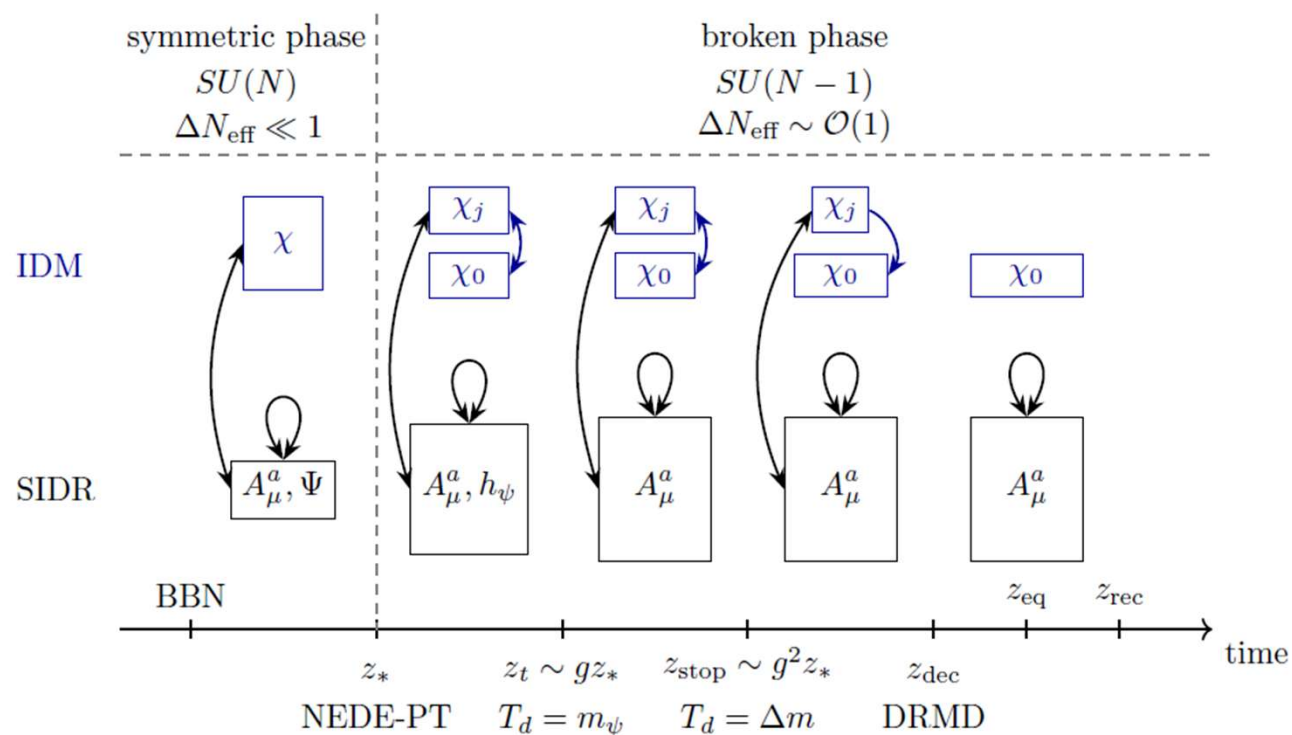
Motivation

- Hubble tension $\sim 5\sigma$
- New standard model?
- Constraints from BAO
 - $r_d \cdot H_0$



Perivolaropoulos, L. et al.
arXiv: 2105.05208

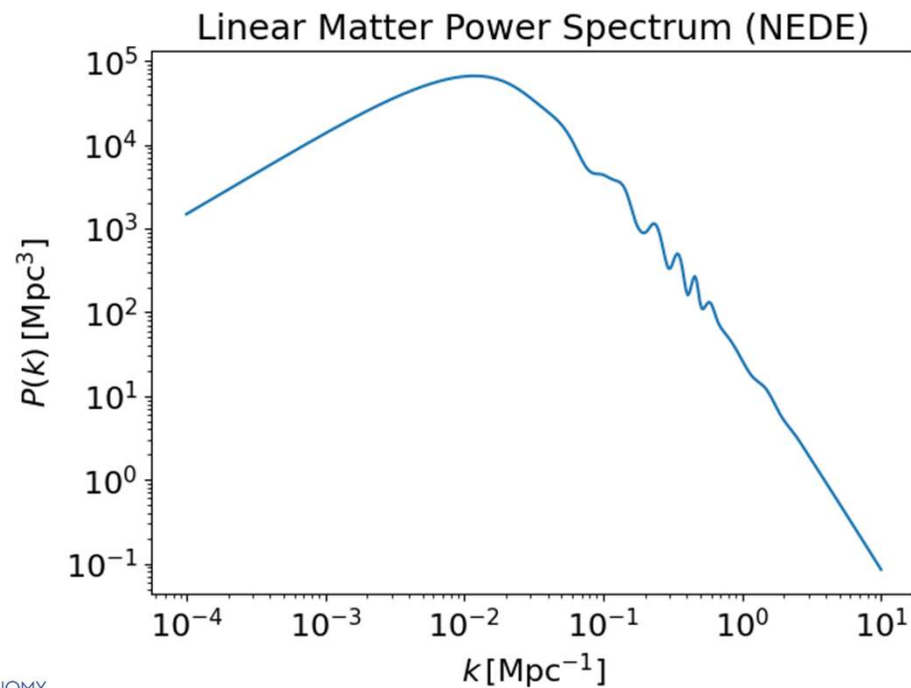
Hot New Early Dark Energy



Garny et al.
arXiv: 2508.03795

Method

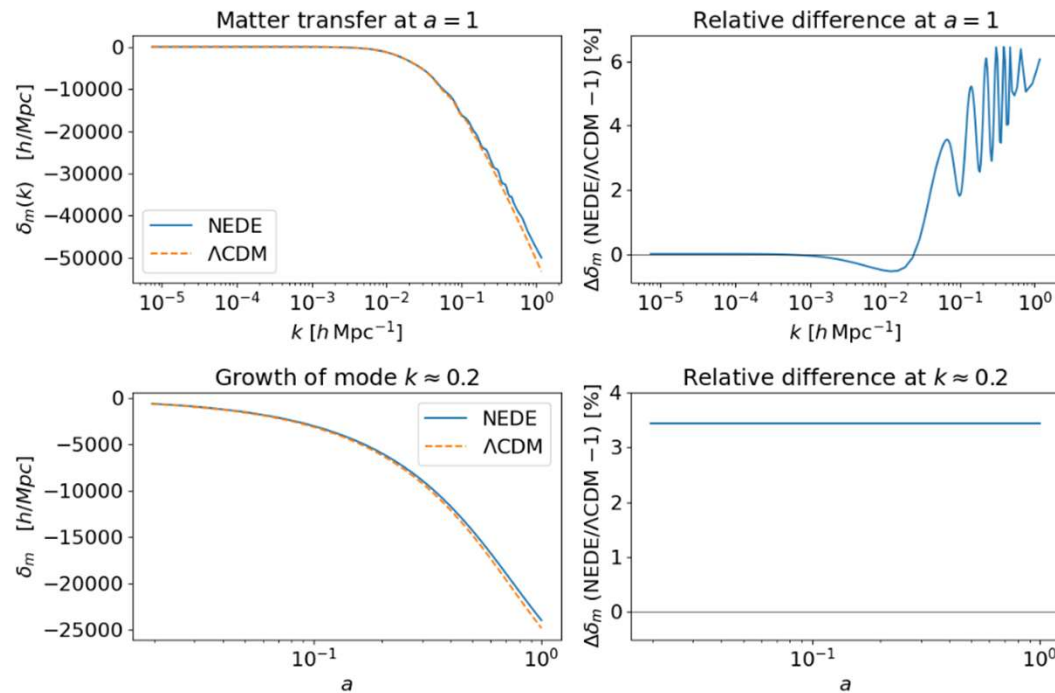
- Goal: Non-linear observables
- Problem: N-body codes are built to Λ CDM



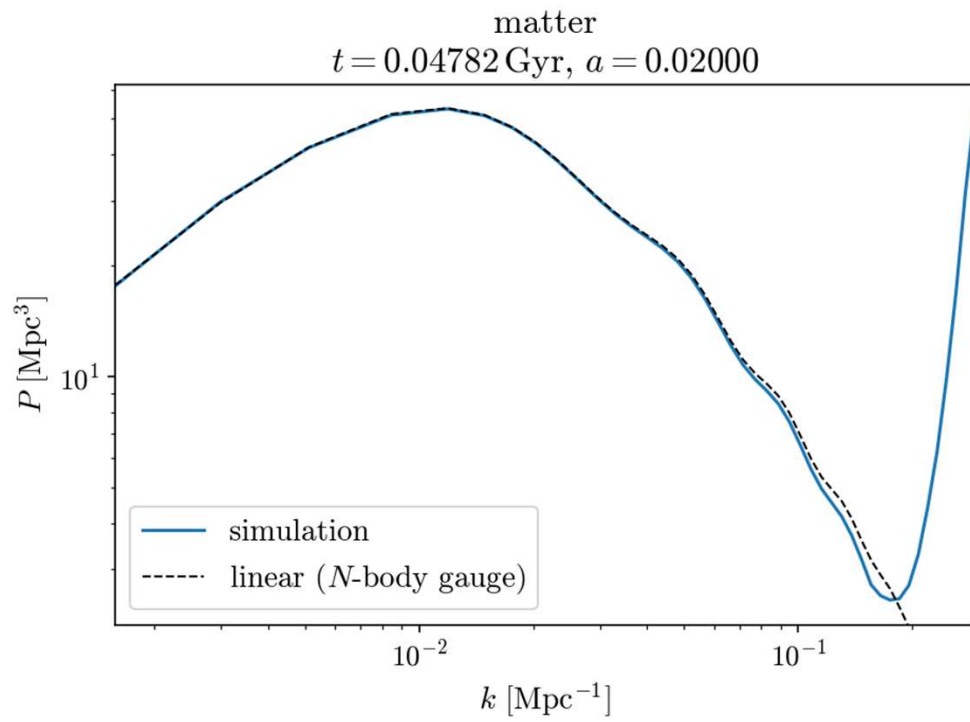
Method

- Background matching → effective model
- Amplify primordial spectrum

$$P_{pri}(k) = \pi \sqrt{2A_s} k^{-\frac{3}{2}} \left(\frac{k}{k_{pivot}} \right)^{\frac{n_s-1}{2}} \exp \left(\frac{\alpha_s}{4} \log \left[\frac{k}{k_{pivot}} \right]^2 \right) R(k)^2, R(k) = \frac{T_{NEDE}(z=50)}{T_{\Lambda CDM, eff}(z=50)}$$

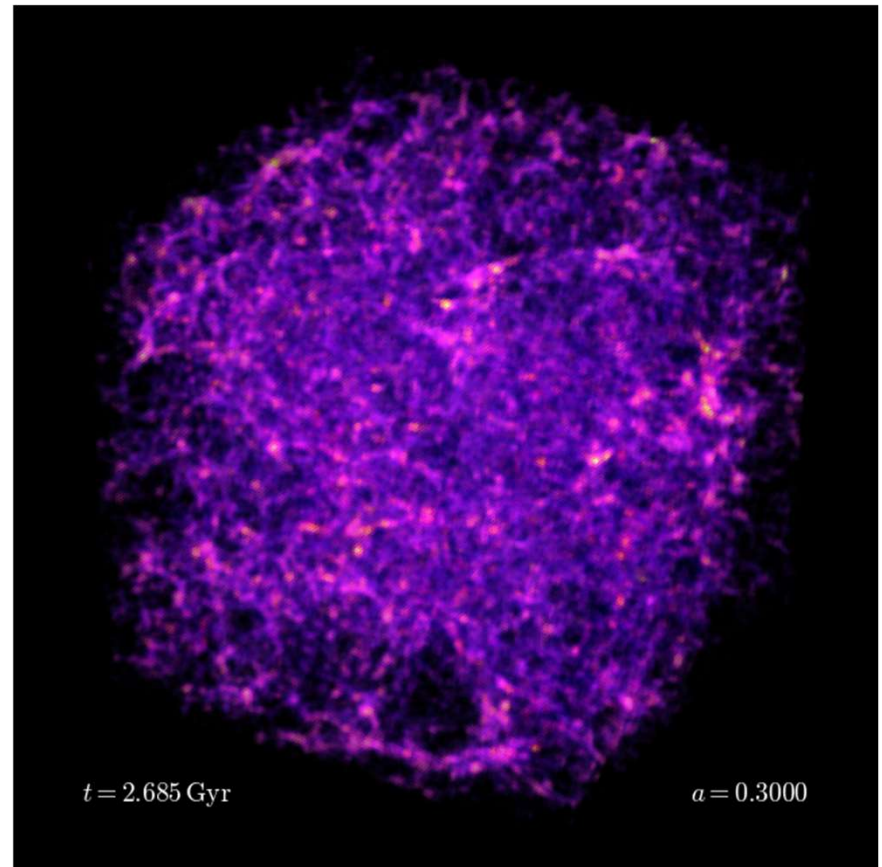


Next steps



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Summary

- Hubble tension prompts search for new physics
- NEDE model introduces dark sector
- Make BSM compatible with N-body codes
- Analyse and compare to Λ CDM

Thank you