

Constraining Dark Matter - Dark Radiation Interactions With Lyman- α data

Deanna C. Hooper

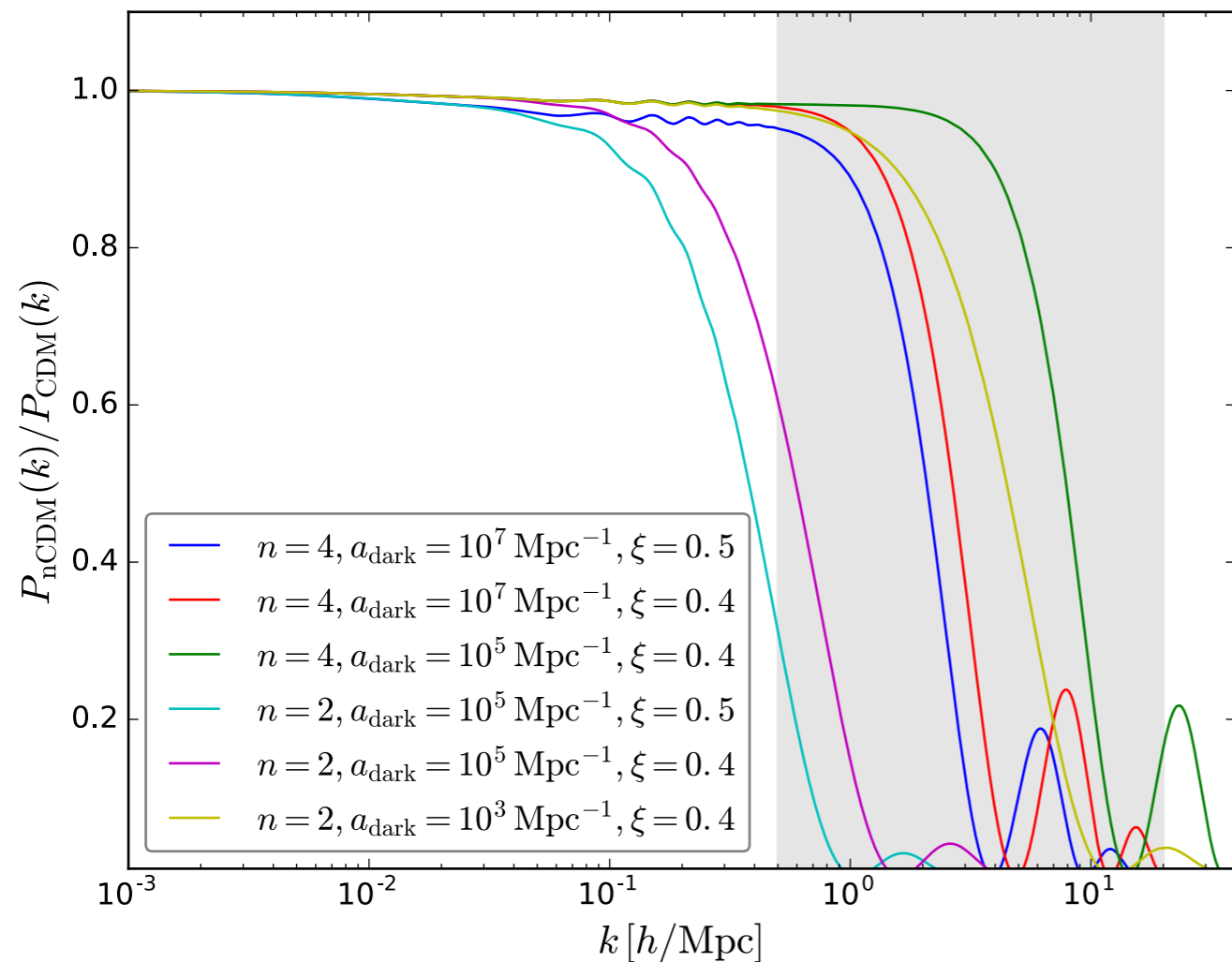
*Based on Archidiacono, **DCH**, Murgia,
Bohr, Lesgourgues, Viel (1907.01496)*

COSMO'19 Aachen
2nd September 2019

DM-DR

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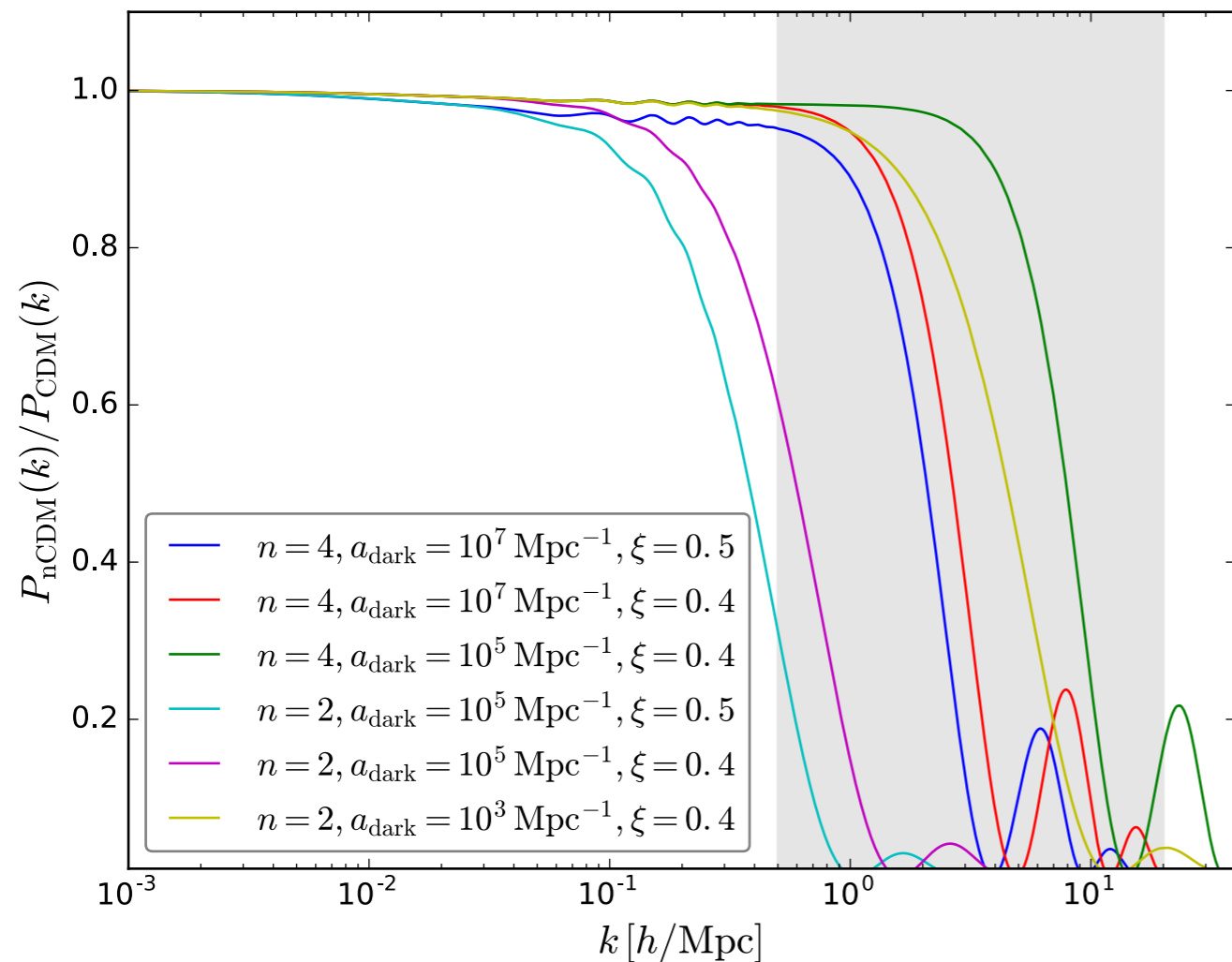


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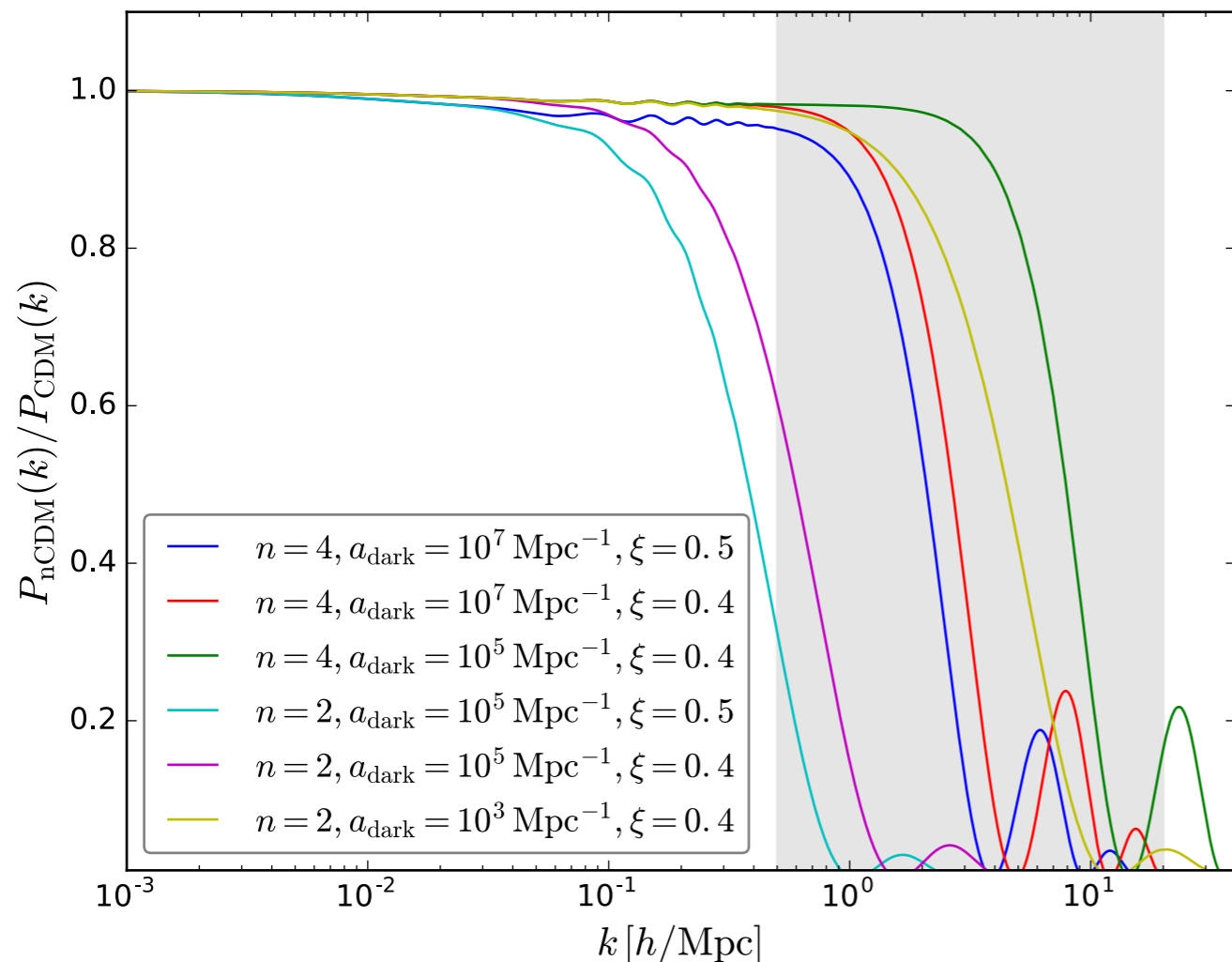


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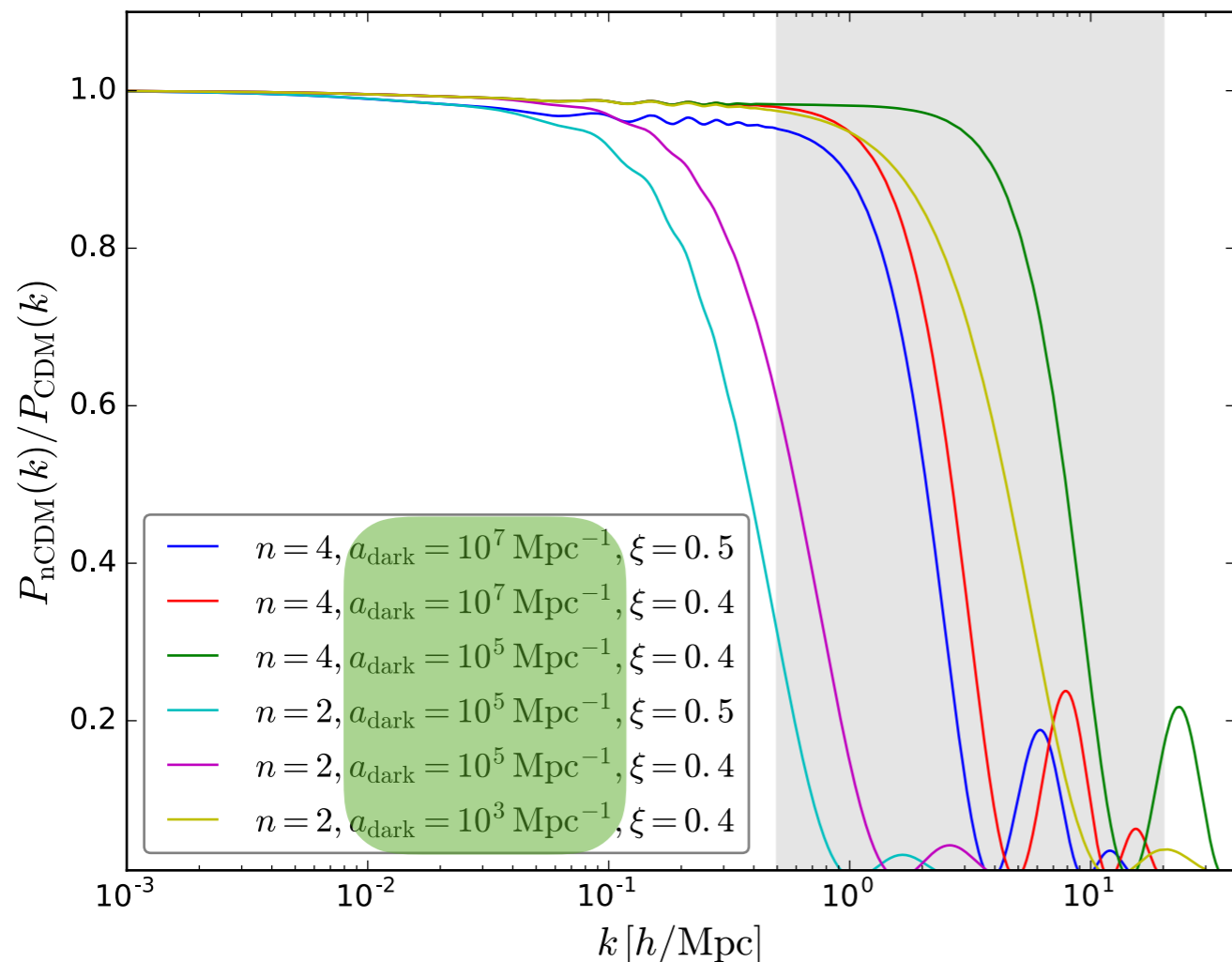


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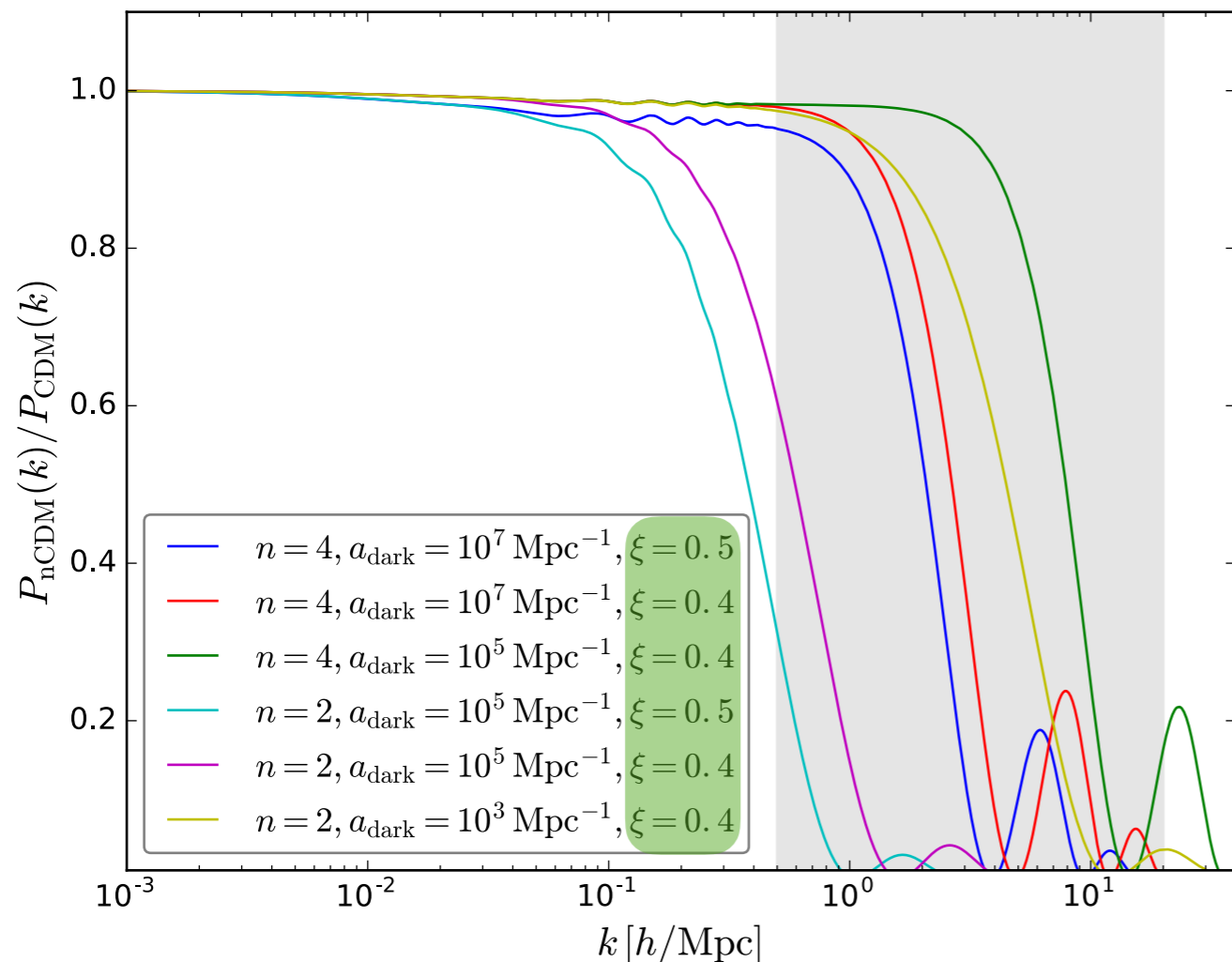


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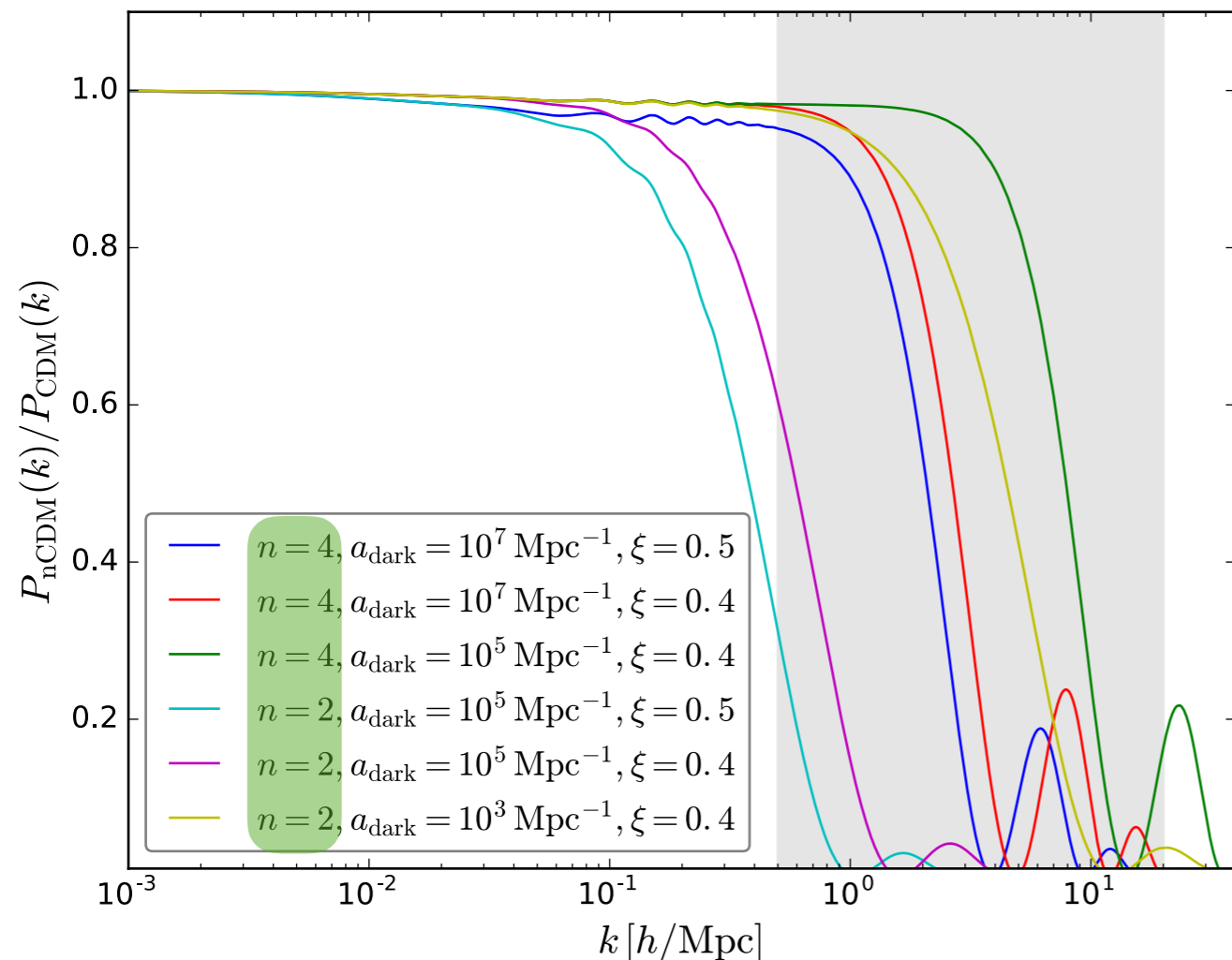


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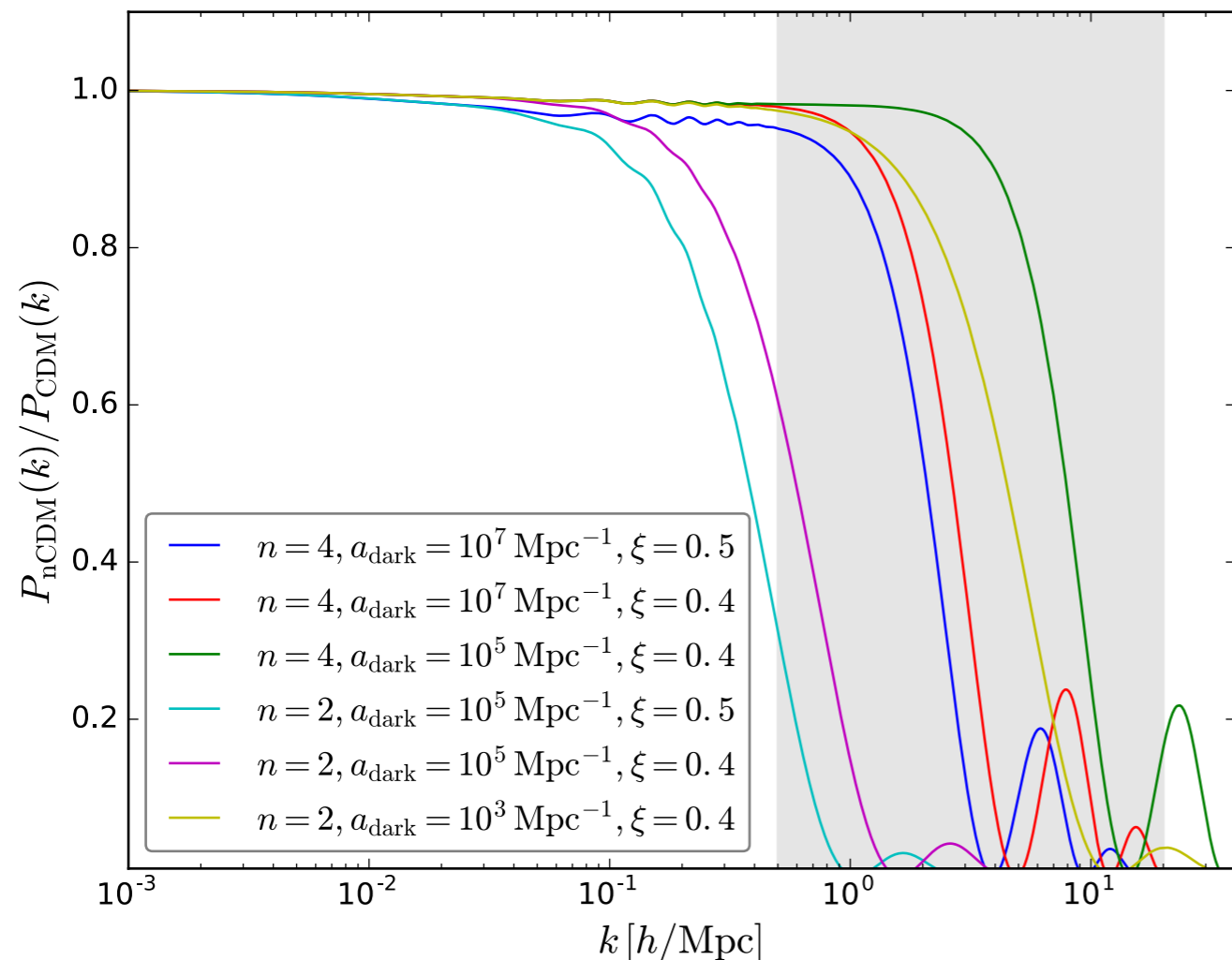


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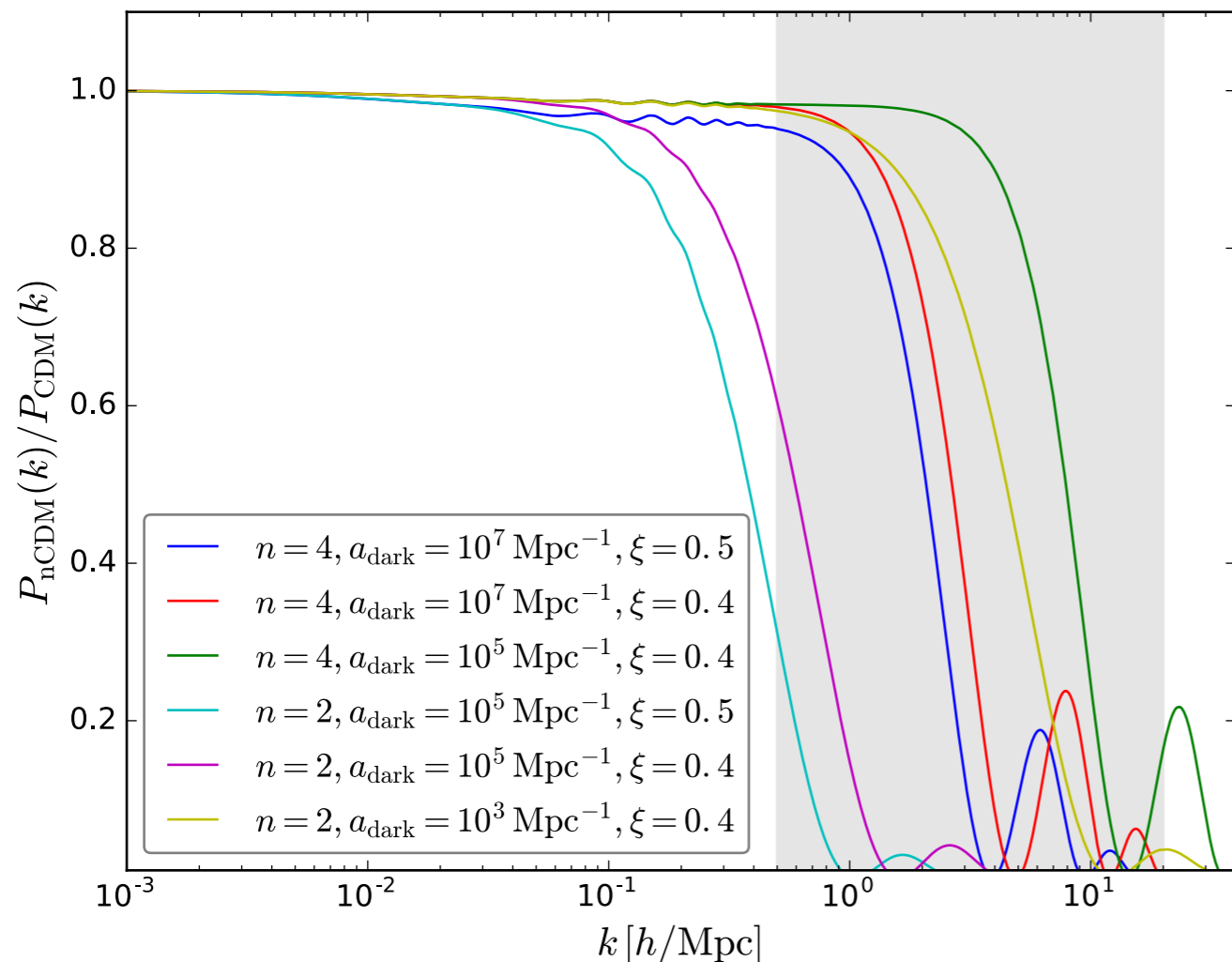


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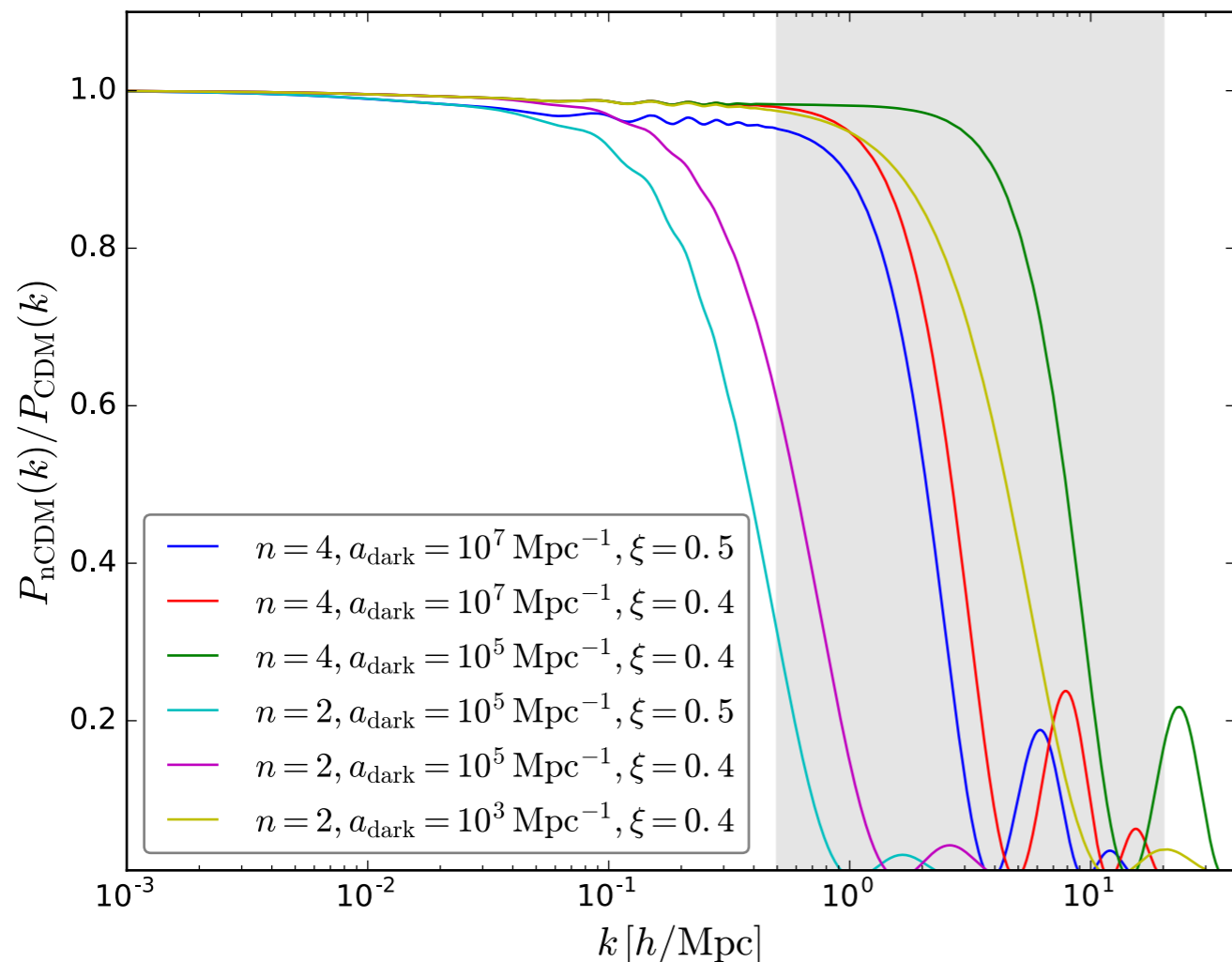


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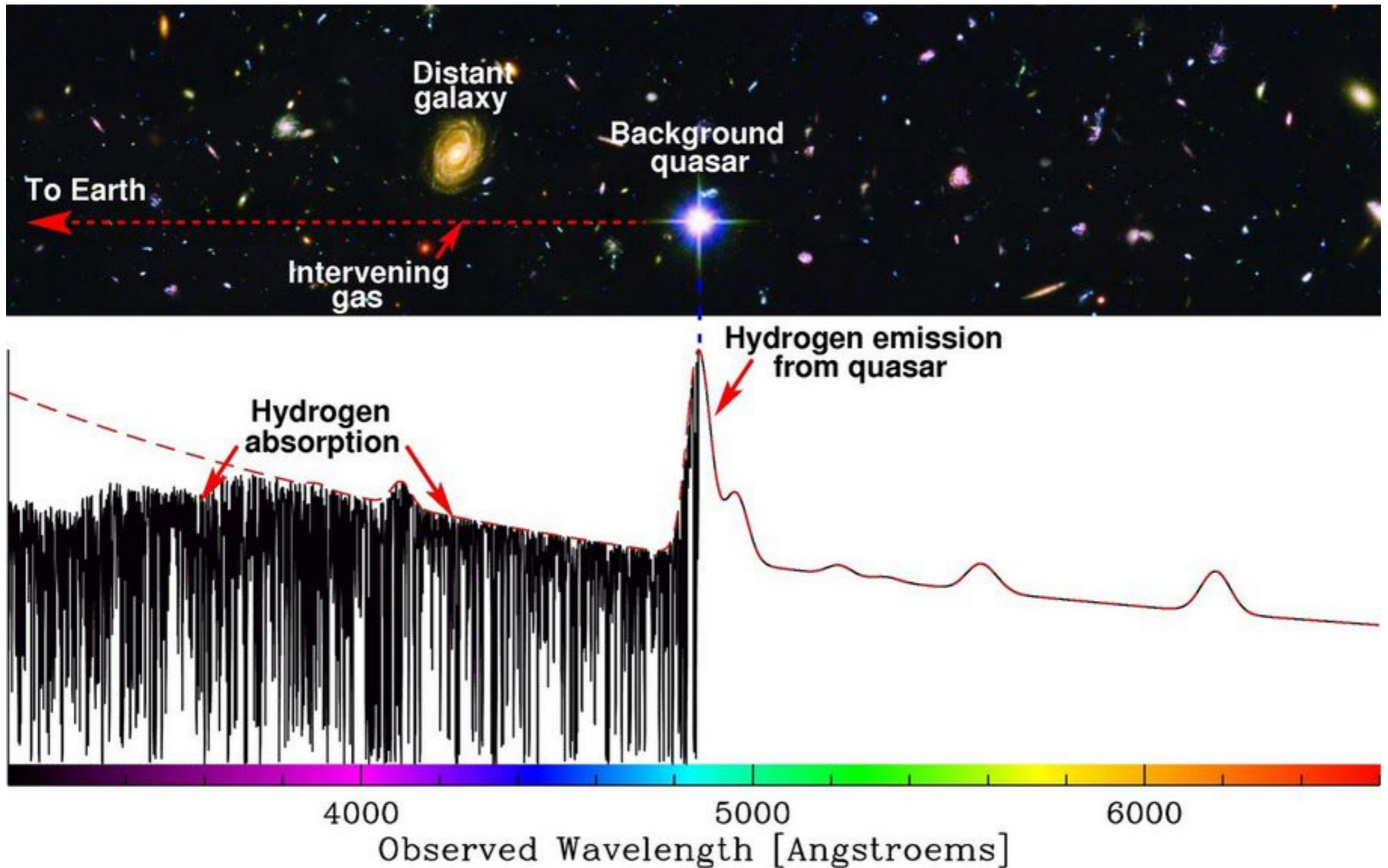
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- Depending on the value of n , these interactions can mitigate the small scale crisis ($n = 4$) or alleviate the H_0 and σ_8 tensions ($n = 0$)

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- IGM filament modelling requires nonlinear evolution: this needs N-body hydrodynamical simulations
- Every new set of cosmological parameters would require new simulation, making MCMC analyses prohibitive

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- Alternative: focus on the suppression of the matter power spectrum. Following Murgia et al. (1704.07838), we use the parameterisation

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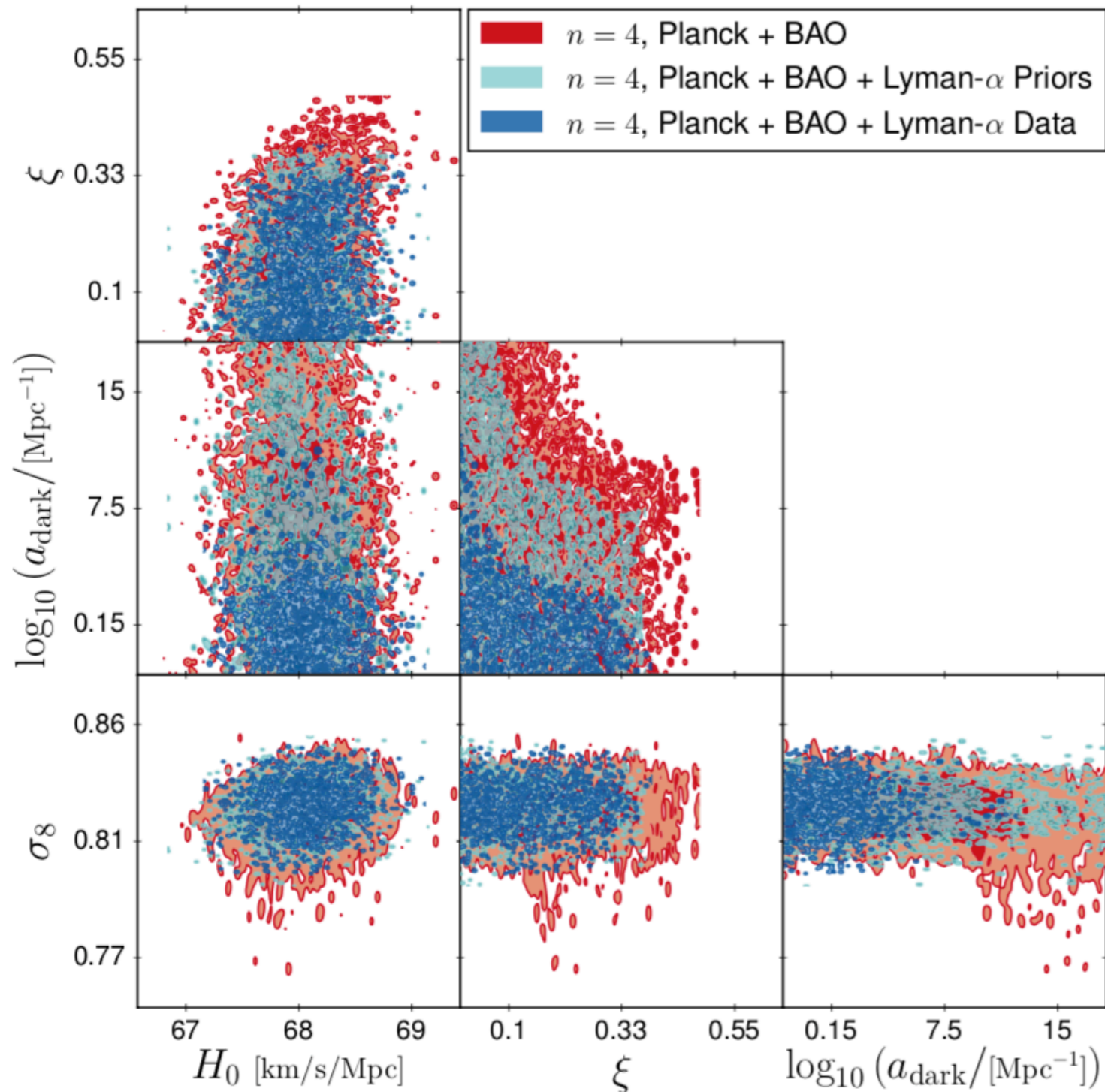
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- Interpolate in our grid of simulations to obtain χ^2

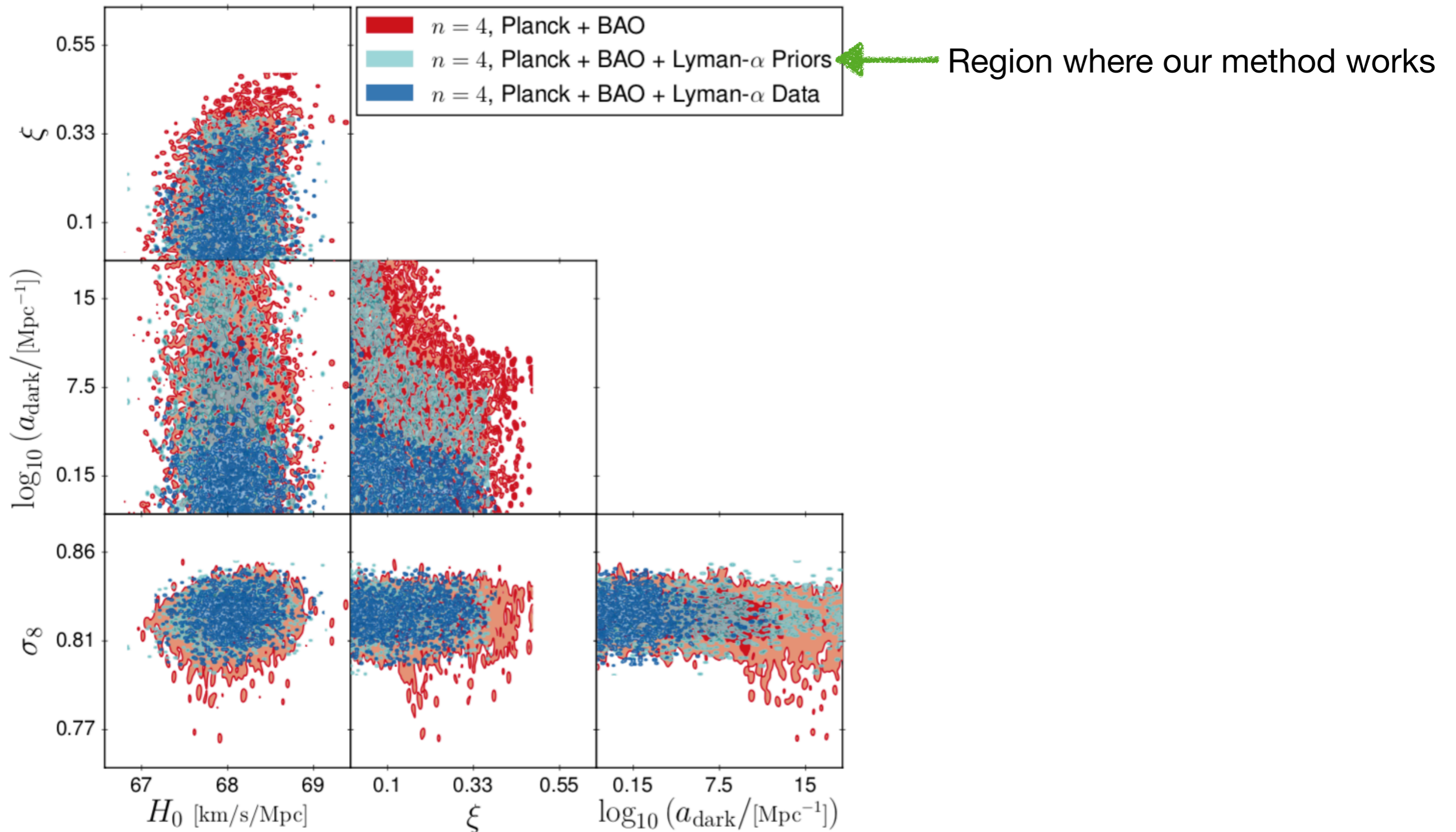
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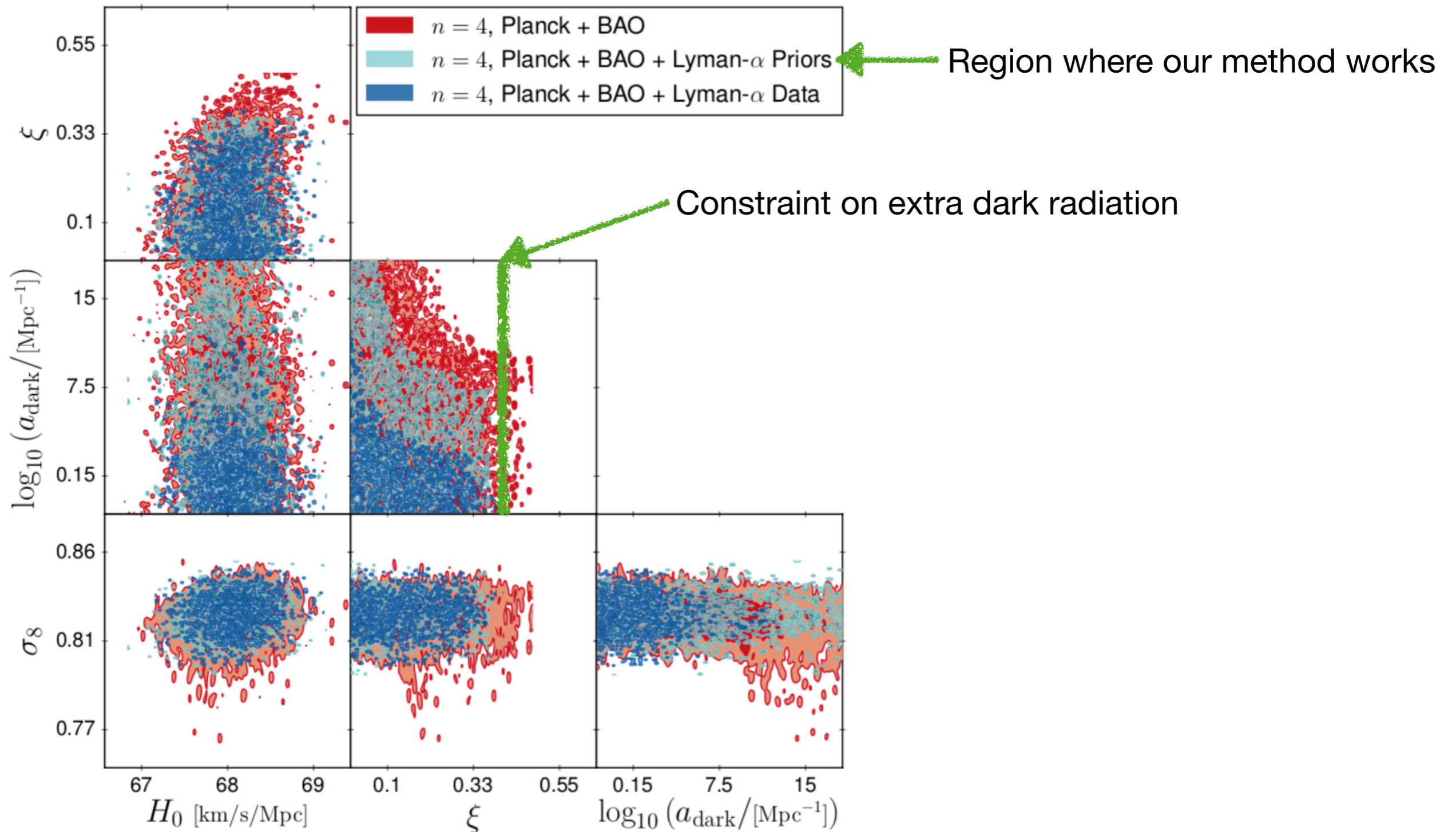
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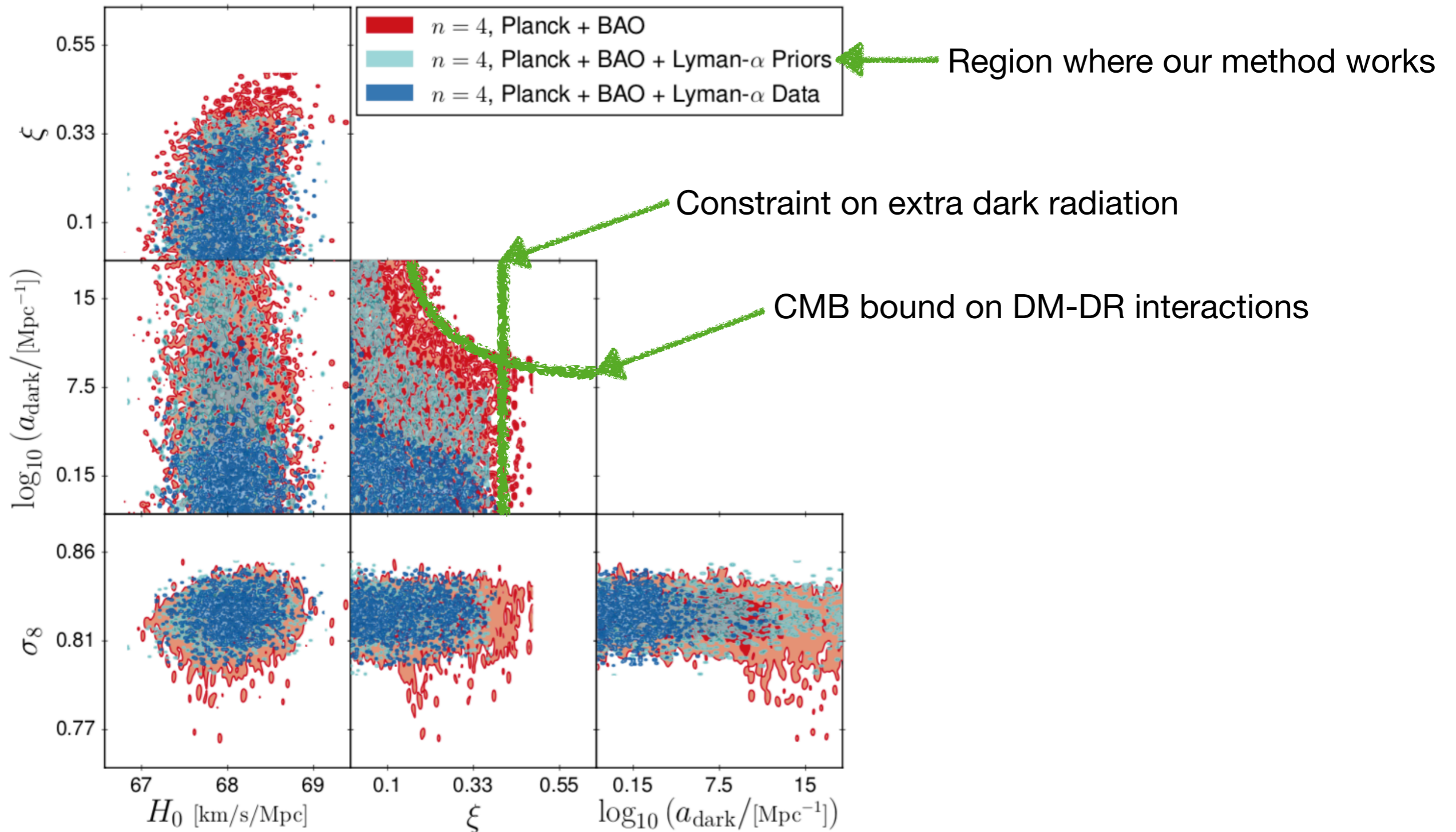
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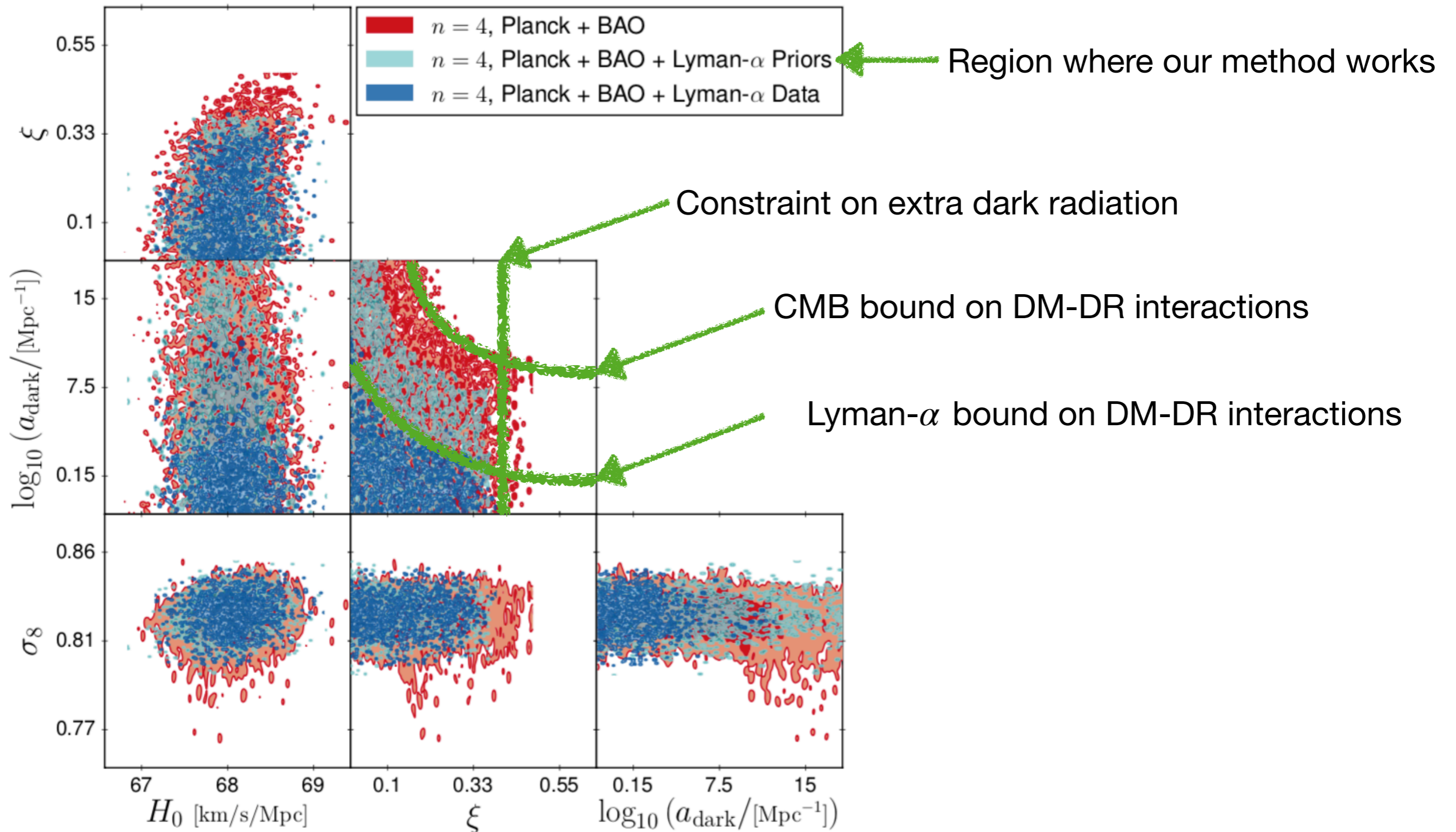
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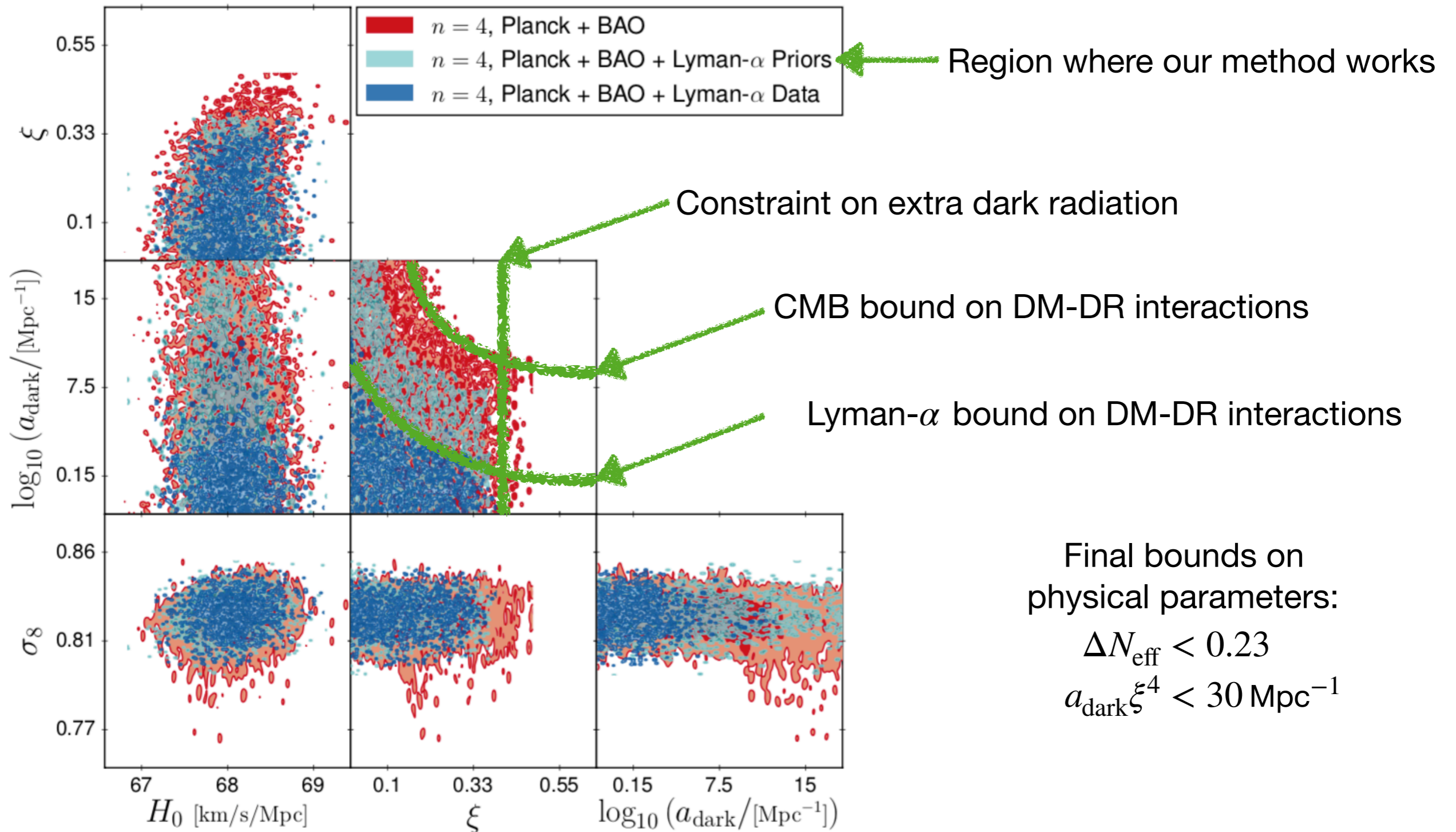
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Summary

- Some unresolved tensions in Λ CDM still remain. Interacting Dark Matter models offer many possibilities to alleviate these tensions
- Effects on matter power spectrum make Lyman- α data crucial to constrain these models
- Novel parameterisation allows us to interpolate in pre-computed grid of hydrodynamical simulations, allowing for MCMC analysis
- We obtained state-of-the-art constraints on interaction strength and amount of DR

Thank you for your attention