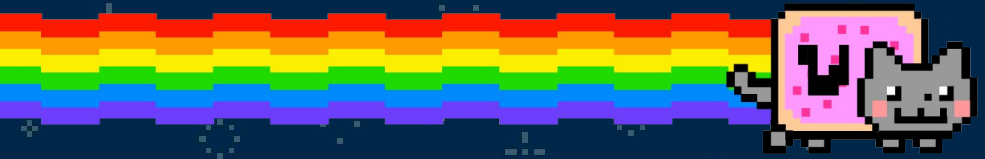

UNDERSTANDING BETTER THE COSMOLOGICAL BOUNDS ON NEUTRINO MASSES

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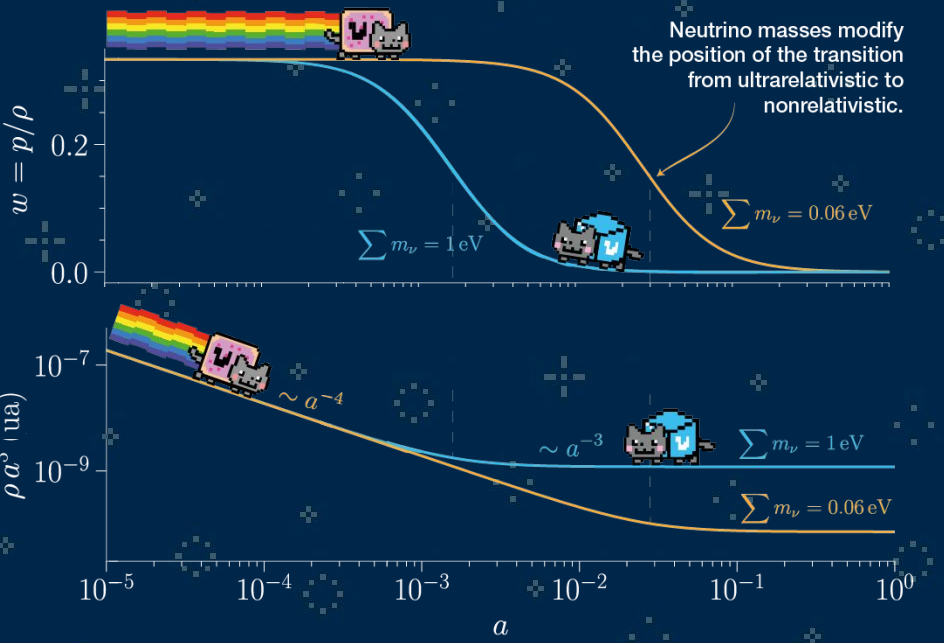
arXiV 2407.XXXXX

INTRO AVAILABLE AT THE TALK OF JORDI SALVADO!

ICCUB | Institut de Ciències del Cosmos UNIVERSITAT DE BARCELONA

EXCELENCIA MARÍA DE MAEZTU 2020-2024

MASS EFFECTS @BACKGROUND



The mass affects the equation of state, which changes the scaling of the energy density (and thus the expansion history).

$$w = \frac{p}{\rho}$$

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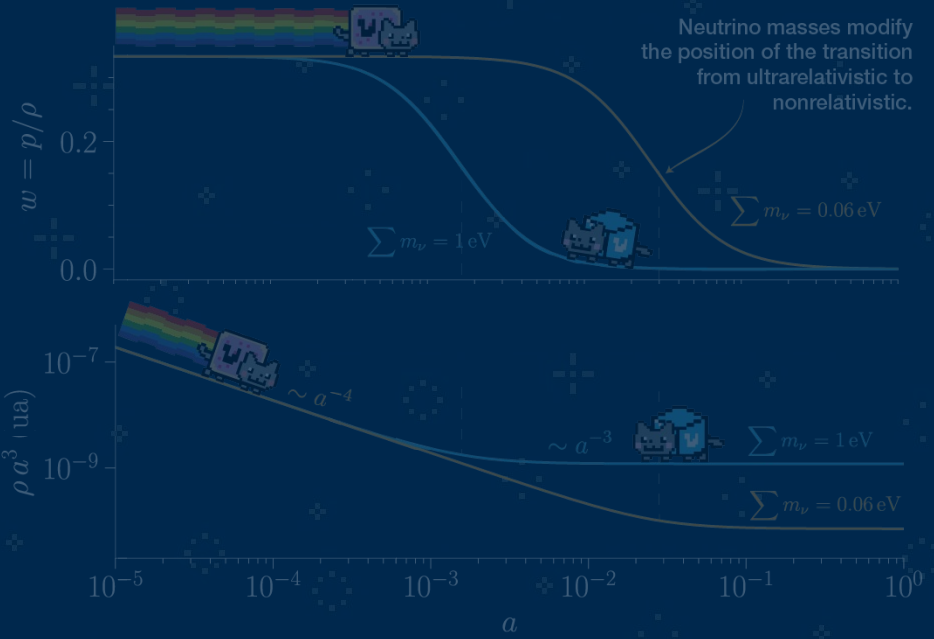

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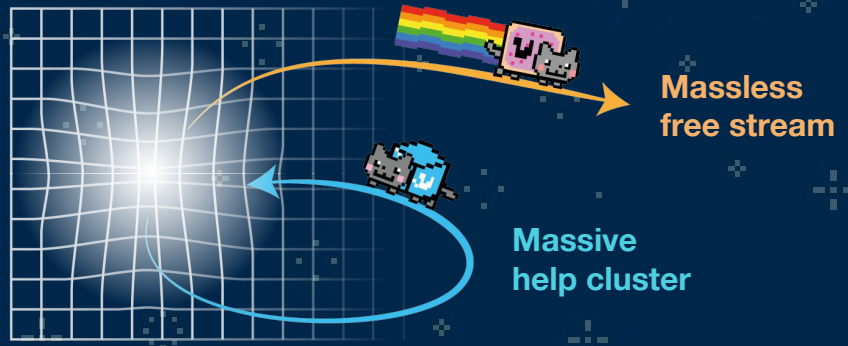
MASS EFFECTS @PERTURBATIONS



$$\delta \equiv \frac{\delta\rho}{\rho} \qquad \theta \sim \vec{\nabla}\cdot\vec{v} \qquad c_s^2 = \frac{\delta P}{\delta\rho} \qquad \sigma$$

$$\sigma \sim -(k_i k_j - \tfrac{1}{3}\delta_{ij})(T_i - \delta_{ij}T^k{}_k/3)$$

Density contrast	Velocity divergence	Sound speed	Anisotropic stress
Fixed by conservation of energy-momentum tensor		Free, except if one assumes an underlying model (e.g. standard neutrinos)	

DISENTANGLING THE EFFECT OF NEUTRINO MASSES

Since mass is not directly observable, we have the freedom to define two parameters which disentangle observable quantities:

$m_{\rm bkg}$ describes w

$m_{\rm pert}$ describes $c_s^2,\ \sigma$

Since there are BSM scenarios where these “masses” can be different, we can understand better what are we measuring exactly and test its robustness.

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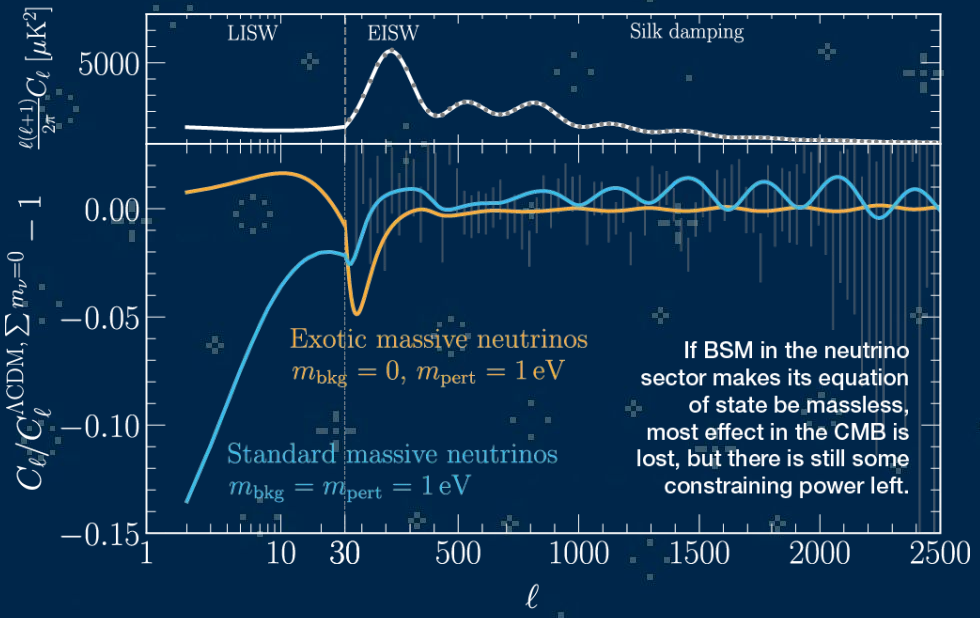
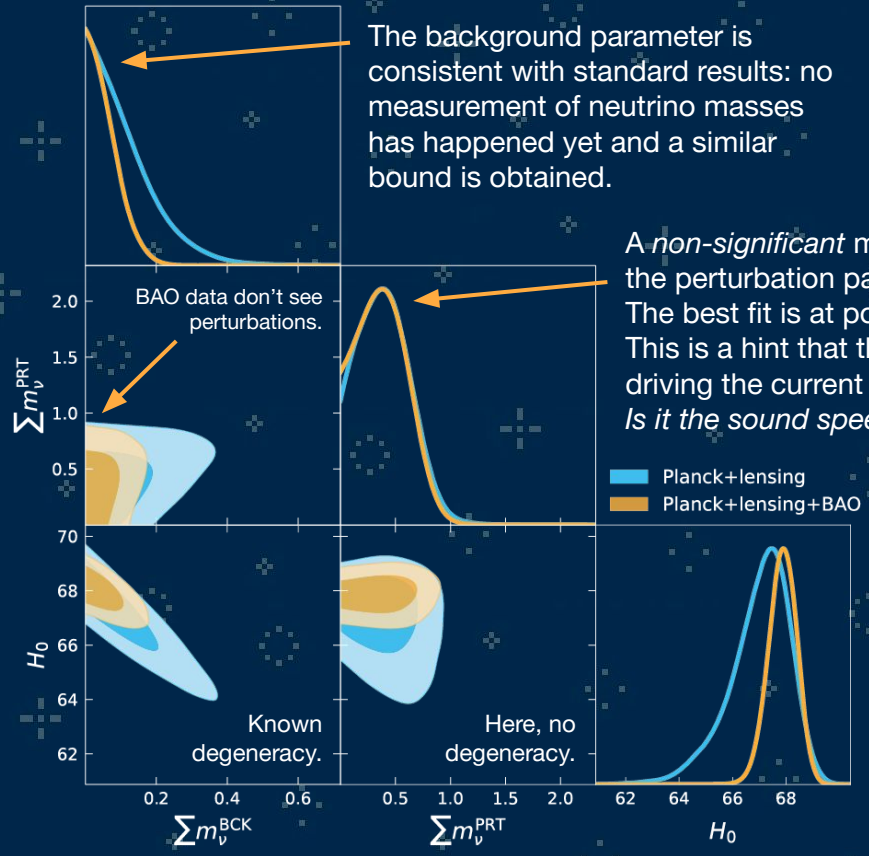


FIRST (PRELIMINARY) RESULTS



The background parameter is consistent with standard results: no measurement of neutrino masses has happened yet and a similar bound is obtained.

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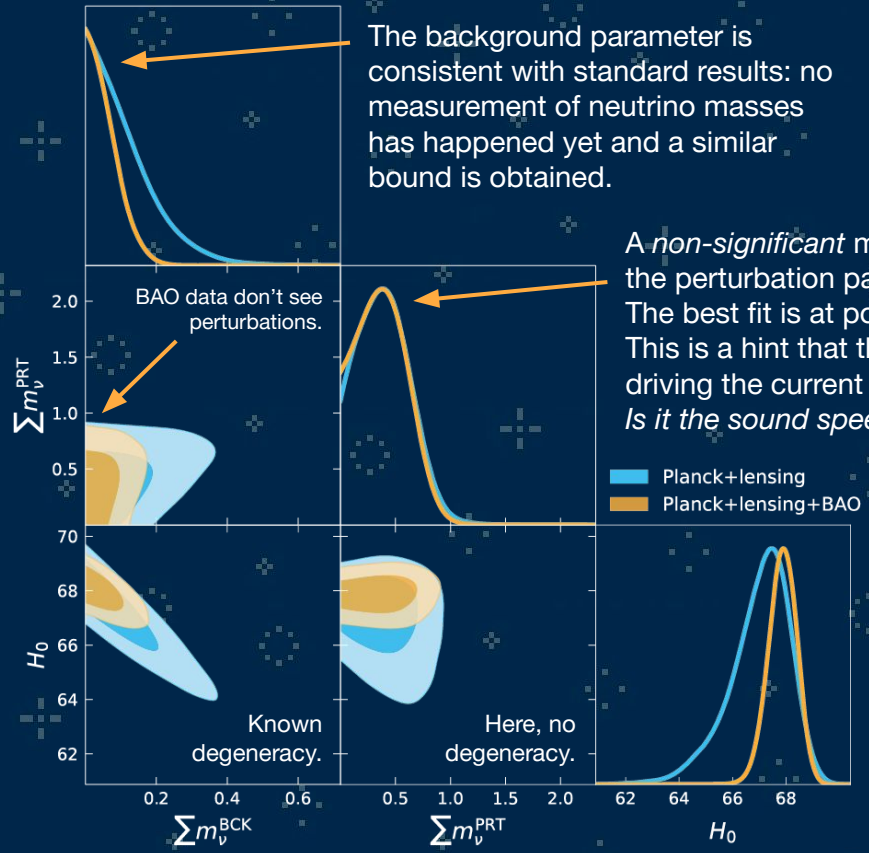

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Come talk about this (and more) at my poster (or around). Thanks (for your attention)!

And many thanks to the whole team!