Research Interest

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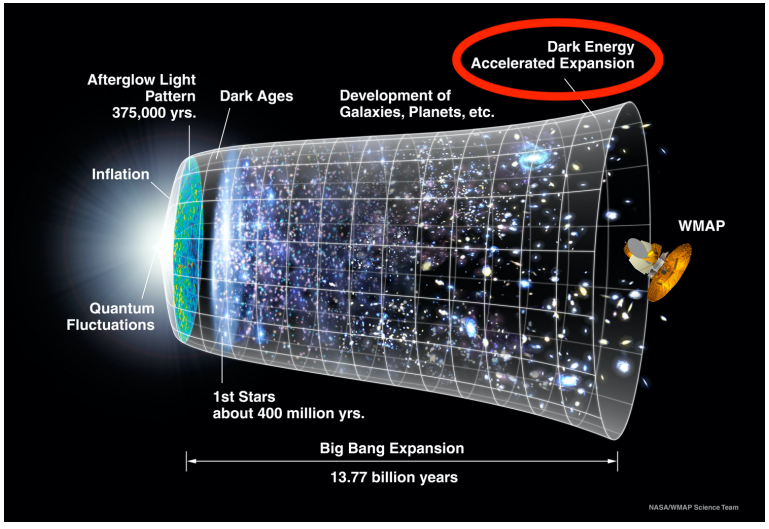
Research Interest

My main research interest is solving the dark energy problem.



https://map.gsfc.nasa.gov/media/060915/index.html

According to the local observations in solar-system, the deviations from GR has not been detected.

Thus the dark energy models must possess screening mechanism.

Types of screening mechanism

- Effective potential: Chameleon, Symmetron
- Nonlinear kinetic terms: D-Blonic, k-essence
- Second-order derivatives: Vainshtein

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- Cuscuton and extended cuscuton

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What I am doing

I am currently constraining the cuscuta-galileon model using the redshift space distortion data.

The cuscuta-galileon is a subclass of the extended cuscuton.

$$S = \int d^4x\sqrt{-g}\Big[\frac{1}{2}M_{\rm PL}^2 R + \alpha_2 M_{\rm PL}^2\sqrt{-X} - V(\phi) + \alpha_3 M_{\rm PL}\ln\left(-\frac{X}{M^4}\right)\Box\phi + 3\alpha_3^2 X\Big] + S_M(g_{\mu\nu},\psi_M)$$

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For an exponential potential, we find the effective Friedmann equation (arXiv: 2202.04908).

$$H^2 = \frac{8\pi G_F(z)}{3}(\rho_m + \rho_r + V_\infty)\,, \quad G_F(z) \approx \begin{cases} \frac{\lambda^2}{(\lambda-4)(\lambda-6)} G_N\,, & \text{in RD} \\ \frac{\lambda^2}{(\lambda-3)(\lambda-6)} G_N\,, & \text{in MD} \\ G_N\,, & \text{in DE} \end{cases}$$

We fit theoretical models using the emcee package.