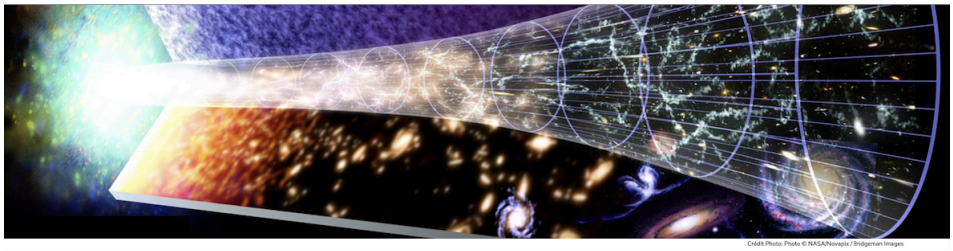

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An emulator for the non-linear matter power spectrum in f(R)CDM cosmology.

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In order to probe modifications of gravity at cosmological scales one needs accurate theoretical predictions. N-body simulations are required to explore the non-linear regime of structure formation but they are, however, very time consuming. In this work we build an emulator that performs an accurate and fast interpolation between the predictions of a given set of cosmological simulations in f(R) modified gravity. We sample a wide 3D parameter space given by the scalar field value 1e-7 < fR0 < 1e-4, matter density 0.24 < Omega_m < 0.39 and primordial power spectrum normalisation 0.6 < sigma_8 < 1.0 with 110 points distributed in a Latin Hypercube. For each model we perform pairs of f(R)CDM and LCDM simulations covering an effective volume of (560 Mpc/h)^3 with a mass resolution of around 2e10 Msun/h. We compute the matter power spectrum boost due to f(R) gravity B(k)=P_f(R)(k)/P_LCDM(k) and build an emulator using a Gaussian Process. The boost depends only on three cosmological parameters and is much more robust against statistical and systematic errors than the raw power spectrum thus strongly reducing our computational needs. The resulting emulator has an accuracy of 3% across the whole parameter space for scales 0.03 h/Mpc < k < 10 h/Mpc and redshifts 0 < z < 2. Such an emulator could be used to probe f(R) gravity with weak lensing analysis.

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