

New domains for analytical methods

Where do you want to see PT applied next?

Anything obvious we have overlooked?

Anything that looks very complicated but could be a game changer?

Perfect theory for imperfect observables, or vice versa:

1. Reconstruction: should we ever do the “full” forward model? Not hard in principle, taking into account mismatches with truth makes things ugly... or just use for BAO and say theory error is small?
2. What about things like marked correlators, cross spectra with constructed operators (density, shear, shift etc.), etc.?
3. Other things with (currently?) weird estimators: intrinsic alignments normalized by projected size, kSZ from squeezed bispectrum, ...
4. What is IA modeling useful for? Can we design better surveys to take advantage of PT modeling, as we do for galaxy densities?

Field-level modeling based on PT

1. Different bias renormalization schemes at field-level and usual n-pt functions? (probably we can match them though)
2. How many bias parameters are necessary for the field-level modeling? In the correlators, we can introduce the bias params order by order, which means at the field-level we will lose the information of higher-order polyspectra when truncating higher-order terms? Then where the information comes from?
3. Single k_{max} in the field-level v.s. Different k_{max} es in n-pt functions
4. Does the constant bias over a survey region still work for the field-level?
5. Is the reconstructed ICs useful for the BAO?

Lyman-alpha:

1. Depends critically on a large set of bias parameters (~ 15 for 1loop Pk)
2. Efficient ways to extract them from simulations? Field level?
3. Can we trust Ly A simulations? Implicit calibrations to FGPA?
4. Two-loop Pk, One-loop bispectrum + trispectrum + PDF. Feasible to measure?

1. How come we can use PT to predict the signal but not the covariances?

Main limitation beyond $P(k)$

2. Momentum power spectrum? A huge consistency test for the EFT

Peculiar velocity survey are happening!

3. Cross-correlations w/ lensing are limited by the matter fields

Can we do 2-loops for matter and 1-loop for bias?

4. Any other non-linear transformation of the density field?

Marked power spectrum or density splits should be EFTable

5. Reionization without the supercomputer

There is a chance some scales can be modeled with the EFT at $10 < z < 20$

Repeat beyond Λ CDM!

Some statistics might not look very interesting in the standard model, but can be transformative for BSM scenarios, e.g. relative velocities.

A relationship between the bias renormalization scheme of conventional PT (also EFTofLSS) and that of iPT (i.e., renormalized bias functions).