Working Group Questions

Effective Field Theory of Structure Formation
Tonale Winter School on Cosmology 2023

Workshop 1: Dark Matter Clustering

- The origin of the Boltzmann equation. What is the difference between the Boltzmann and Vlasov equation?

- Can we really truncate Boltzmann/Vlasov hierarchy? What physics do we omit?

- Perturbative solutions and why do we need them? How do they compare to the alternatives?

- EFT vs alternative perturbative approaches. What are the differences and similarities?

- UV divergencies and how to handle them? Renormalisation.

- Higher loops and higher $n-$point statistics. What is the limit of the PT approach?

- How can we add new particle species, baryons, light dark matter particles?

Workshop 2: Lagrangian Approach

- Difference of the Lagrangian and Eulerian approaches. What are the distinctions and advantages of each?

- BAO and IR resummation. Why is the understanding of BAO shape important? What about reconstruction?

- What about the new physics and features in the primordial power spectrum?

- UV divergencies and renormalisation in the Lagrangian EFT.

- Higher $n-$point statistics in the Lagrangian PT.

Workshop 3: Biased Tracers

- Why is a description of biased tracers in terms of the dark matter operators valid? When does this approach work?

- Equivalence of the different basis for biased tracers. Why are there so many different bias bases?

- What are the relevant physical scales for different tracers?

- How is the bias tracer description affected in the scenarios beyond ΛCDM cosmology?

- Degeneracy of biased tracer description? How can we get to the minimal basis?

- Bootstrap approach to biased tracers. Comparative analysis to the standard approaches.

Workshop 4: Redshift Space Distortions and Observations

- Alternative approaches to describing RSD and their equivalence. Is there a new scale?

- RSD in the Lagrangian and Eulerian frameworks? What are the differences, and how do they affect the BAO?

- Fingers of God (FoG), what is their origin? Are they accounted for in the EFT picture, and what are some existing models?

- How do we know that our theory can describe the data? Simulation challenge and parameter extraction. What are the potential alternative challenge setups?

- Considering current LSS surveys, what are the limits of applicability of PT approaches? On the other hand, what do they tell us about the possibilities of extracting cosmological information from LSS surveys?