Contribution ID: **5** Type: **not specified**

Non-perturbative techniques for constraining the cosmological collider

Tuesday, 7 May 2024 11:30 (10 minutes)

Upcoming large-scale structure (LSS) surveys will provide significant insight into the physics of the early Universe by searching for primordial non-Gaussianity (PNG). Whereas traditional approaches towards constraining PNG with LSS typically focus on phenomenological amplitudes, e.g., $f_{\rm NL}^{\rm loc.}$, which characterize a given "shape" of non-Gaussianity, there exist a range of inflationary scenarios that can produce unique signatures of PNG. A particularly compelling example is the cosmological collider scenario, wherein the presence of massive spinning particles during inflation can lead to poles or oscillations in the squeezed bispectrum. In this talk, I will present a novel approach towards running and analyzing N-body simulations with initial conditions generated for cosmological collider type models. Using these simulations, I will validate a model for the non-linear squeezed matter bispectrum and collapsed trispectrum for the collider physics scenario based on the LSS consistency relations – non-perturbative statements about the structure of LSS correlation functions derived from symmetries of the LSS equations of motion. Finally, I will comment on how these simulations and non-perturbative models can be used to develop pipelines to directly constrain the masses and spins of particles present during inflation.

Primary author: GOLDSTEIN, Samuel (Columbia University)

Co-authors: Prof. HILL, J. Colin (Columbia University); Dr PHILCOX, Oliver (Columbia University; Simons Society of Fellows)

Presenter: GOLDSTEIN, Samuel (Columbia University)

Session Classification: Session 6