

# Fast estimation of gravitational and primordial bispectra in large-scale structures & a simple model for small scales

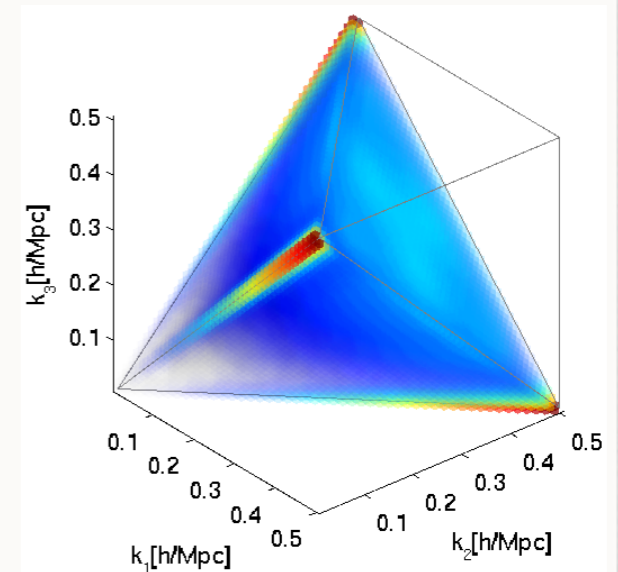


Marcel Schmittfull\*, Donough Regan<sup>o</sup>, Paul Shellard\*

\*DAMTP Cambridge, <sup>o</sup>University of Sussex



- Fast and general non-Gaussian **initial conditions** for N-body simulations (arbitrary bispectra, diagonal-independent trispectra; uses separable expansions)
- Fast and general **bispectrum estimator** for N-body sims (measures  $\sim 50$   $f_{\text{NL}}$ 's of separable basis shapes & combines them)
- Measured gravitational & primordial DM bispectra (all triangles down to small scales,  $k=2h/\text{Mpc}$ ; characterises 3d DM structures like pancakes, filaments, clusters; non-linearities mainly enhance 'constant' bispectrum)
- **Time Shift Model:** Primordial non-Gaussianity gives the growth of 1-halo bispectrum a delay or head start
- Simple **fitting formulae** for gravitational and primordial DM bispectra (valid at  $0 \leq z \leq 20$ ,  $k \leq 2h/\text{Mpc}$ )



$f_{\text{NL}} > 0$