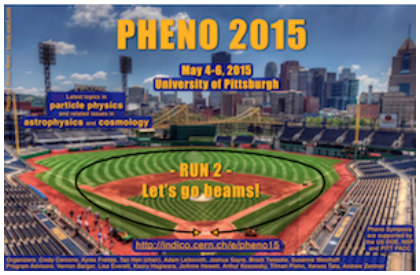

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Primordial non-gaussianity from the bispectrum of 21cm fluctuations in the dark ages

Monday 4 May 2015 16:45 (15 minutes)

Measuring primordial non gaussianity will be the next observational milestone for inflation studies, since it will help us set apart the different inflationary models.
CMB observations of non gaussianity are cosmic-variance limited and, at this point, almost all the information possible has been extracted.
A popular alternative is the 21-cm line during the dark ages ($z \sim 30 - 100$). The absence of a damping (Silk) scale during this epoch enables us to reach scales much smaller than with CMB studies, which added to using information from different redshift slices can greatly improve upon current bounds.
We study the theoretical prospects for these observations.
As opposed to CMB anisotropies, which are highly linear, the 21-cm fluctuations are intrisincally non linear, generating secondary non gaussianities. The main secondary contributions come from gravitational evolution and the non-linear dependence of the tracer on the underlying density field. These secondary non gaussianities can be highly correlated with the primordial one, so a careful Fisher analysis is needed. We find that the correlations lower the signal-to-noise ratio by a factor of ~ 10 from naive (uncorrelated) studies, such as the ones in the literature.
An experiment with a bandwith of 1 MHz and angular resolution of 1/10 of arcminute could achieve a detection on the order of $f_{\rm NL}^{\rm local} \sim 0.07$, $f_{\rm NL}^{\rm equil} \sim 3.3$ and $f_{\rm NL}^{\rm ortho} \sim 1.5$ in the cosmic-variance limit.

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