Contribution ID: **15** Type: **not specified**

Applying the Compressed Sensing Protocol on Cosmological Signals

Thursday 30 May 2019 17:00 (15 minutes)

Large scale galaxy surveys have shown its ability to constraint cosmological parameters mostly through the analysis of the correlation function and the power spectrum.
The Nyquist criterion underlies the design of these large surveys by imposing a condition on the minimal number density of tracers required to recover the matter density signal corresponding to a given wave-number. Here, we illustrate how the compressed sensing (CS) protocol can help to by pass the limitations imposed by this criterion.
CS establishes that, if a signal is sparse in some suitable domain, it can be reconstructed perfectly from a small number of random measurements, overcoming the limitations in the well-known Nyquist criterion.
CS has already played a pivotal role in magnetic resonance imaging (MRI), applied mathematics, physics and more recently in machine learning.
Here we will show preliminary results on simulations to demonstrate how CS can make an impact on the interpretation of data from large experiments such as the Dark Energy Spectroscopic Instrument.

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Session Classification: Cosmology