Abstract Submitted
for the OSS11 Meeting of
The American Physical Society

Self-Similar Bumps and Wiggles: Isolating the Evolution of the BAO Peak with Powerlaw Initial Conditions[1] CHRIS ORBAN, DAVID WEINBERG, The Ohio State University — Future observations of a subtle dark matter clustering feature known as Baryon Acoustic Oscillations (BAO) will play a key role in unraveling the mystery of dark energy. Originally detected in galaxy clustering data from the Sloan Digital Sky Survey and the Two-Degree Field Survey, by observing this feature the cosmological distance to galaxies at a particular redshift can be accurately determined and the expansion history of the universe constrained with high precision. A complication of this analysis, however, is that the clustering feature changes over time – the "bump" feature broadens and is shifted slightly. We investigate a simplified model of Baryon Acoustic Oscillations using cosmological N-body simulations to better understand the underlying physics of how this feature evolves. We model our simulation results both phenomenologically and compare with ab initio predictions from perturbation theory, yielding useful insights for more physically-motivated cosmological models. The simplicity of our setup also allows interesting self-similar numerical tests that indicate that modern simulation methods and resolutions robustly capture the non-linear evolution of the BAO feature.

[1]Supported by the OSU Center for Cosmology and Astro-Particle Physics and grants from the NSF.

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Date submitted: 24 Feb 2011 Electronic form version 1.4