

Abstract Submitted
for the TSF11 Meeting of
The American Physical Society

Cosmology in One-dimension: Correlation, Virialization and Void Geometry BRUCE MILLER, Texas Christian University, JEAN-LOUIS ROUET, Universite d'Orleans — Concentrations of matter in the universe, such as galaxies and galactic clusters, originated as very small density fluctuations in the early universe. The existence of galaxy clusters and super-clusters suggests that a natural scale for the matter distribution may not exist. A point of controversy is whether the distribution is fractal and, if so, over what range of scales. Even with recent astronomical surveys and simulations, it is difficult to extract information concerning fractal properties with confidence. With one-dimensional models we can overcome these limitations by carrying out simulations with on the order of a quarter of a million particles. They clearly demonstrate that the important dynamics for cluster formation occurs in the position-velocity plane. Here we present the recent results of our on-going study of the fractal geometry of one dimensional models of the expanding universe. The evolution of the power spectra and correlation function will be followed and their relation to the correlation dimension will be explored. Evidence of the development of virialization and an improved approach for determining the fractal dimensions of low density regions (voids) will be presented.

Bruce Miller
Texas Christian University

Date submitted: 09 Sep 2011

Electronic form version 1.4