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Emergence of Fractal Geometry in One-Dimensional Models of the Expanding Universe[1] BRUCE MILLER, Texas Christian University, JEAN-LOUIS ROUET, EMMANUEL LE GUIRRIEC, Universite d'Orleans — Concentrations of matter in the universe, such as galaxies and galactic clusters, originated as very mall density fluctuations in the early universe. The primordial fluctuation spectrum is revealed by studies of the angular correlation of CMB across the sky with WMAP. The existence of super-clusters and voids suggests that a natural length 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. The source of fractal behavior is the lack of a length scale in the two body gravitational interaction. Even with new, larger, sample sizes from recent surveys, it is difficult to extract information concerning fractal properties with confidence. Similarly, simulations with a billion particles only provide a thousand particles per dimension, far too small for accurate conclusions. With one dimensional "toy models" we can overcome these limitations by carrying out simulations with on the order of a quarter of a million particles without compromising the computation of the gravitational field. Here we present the recent results of our ongoing investigation of the emergence of fractal geometry in one dimensional models of the expanding universe.

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