Department of Theoretical Physics

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Shedding light on Dark Matter with Cosmological observations

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Room A304

The universe is homogeneous and isotropic at the largest scales. However, on smaller scales, we see a whole hierarchy of structures ranging from stars, field galaxies, clusters of galaxies, superclusters, filaments, and sheets separated by voids. Many descriptions, like the BBGKY hierarchy, have been proposed to explain this large-scale distribution of matter in the universe, each having its virtues and deficiencies. We show that an analytical theory based on statistical mechanical considerations, invoking quasi-equilibrium conditions, provides a more elegant description of various aspects of gravitational galaxy clustering, in particular, the distribution functions. Besides providing a more fundamental basis for the earlier results, the theory shows excellent agreement with both observations and N-body simulation results.

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