



# Shapes and Probabilities of Galaxy Clusters

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We develop a general theory for estimating the probability that a galaxy cluster of a given shape exists. The theory is based on the observed result that the distribution of galaxies is very close to quasi-equilibrium, in both its linear and nonlinear regimes. This places constraints on the spatial configuration of a cluster of galaxies in quasi-equilibrium. In particular, we show that that a cluster of galaxies may be described as a collection of nearly virialized subclusters of approximately the same mass. Clusters that contain more than 10 subclusters are very likely to be completely virialized. Using our theory, we develop a method for comparing probabilities of different spatial configurations of subclusters. As an illustrative example, we show that a cluster of galaxies arranged in a line is more likely to occur than a cluster of galaxies arranged in a ring.

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