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Likelihoods for cluster abundance cosmology

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A standard choice for cosmological cluster analyses is a Poissonian likelihood; however such a likelihood neglects the effects of sample variance from density fluctuations across the survey volume. To date this assumption has been justified but to make the most of the future data such as that of the Rubin Observatory and the Euclid satellite, improvements to the cluster likelihood must be considered. The simplest way to deal with the effects of sample variance is by using a Gaussian approximation, however with such an approximation we lose valuable cosmological information. We present a framework for testing accuracy of the standard choices of likelihood by comparing to a distribution which is able to account for both the Poisson-like statistics of galaxy cluster abundance and the additional sample variance.

Auteur principal: PAYERNE, Constantin (LPSC (IN2P3))

Orateur: PAYERNE, Constantin (LPSC (IN2P3))

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