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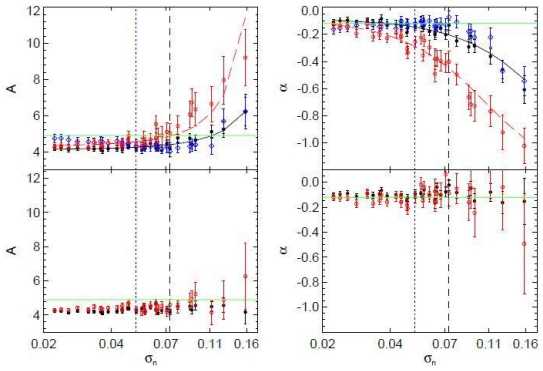
TIME: Wednesday, 2:30 PM, Nov. 06 2013 LOCATION: A601 NAOC

Weak lensing studies on c-M relation of clusters of galaxies: center offset, shape noise and selection effect

Mr. Wei Du (Peking University)

Mr.Wei Du (杜伟) is a five-year PhD student in the Department of Astronomy at Peking University majoring in Astrophysics. He is working on the determination of mass density distribution of galaxy clusters using weak lensing method with his supervisor Prof. Fan Zuhui.



Abstract

With the halo catalog from the Millennium Simulation, we analyze the weak-lensing determined density profiles for clusters of galaxies, paying attention to the determination of the c-M relation which can be biased by the center offset, selection effect and the noise from intrinsic ellipticities of background galaxies.

Several different methods to locate the center of a cluster from weak lensing effects alone are explored. With the parameterized Navarro-Frenk-White (NFW) profile, we fit the reduced tangential shear signals around different centers identified differently. It is shown that for the ensemble median values, a center offset larger than 100 kpc can bias the derived mass and concentration significantly lower than the true values especially for low mass halos. However, the existence of noise can compensate the offset effect and reduce the systematic bias although the scatters of mass and concentration get significantly larger. Statistically, the bias effect of center offset on the concentration-mass (c-M) relation is insignificant if an appropriate center finding method is adopted.

On the other hand, the existence of noise can bias the c-M relation derived from a sample of weak lensing analyzed clusters, making the dependence of the concentration on the mass apparently stronger than that obtained directly for the 3-D simulated clusters. The larger the noise level is, the stronger the bias effect is. To account for the scatters in both variables (c and M) and their covariance, we develop a Bayesian method to improve the statistical analysis of c-M relation. In this new method, the selection effect is also taken into account by introducing the halo mass function (which can be modified easily if a selection function suitable for a specific cluster sample is given). The application of this Bayesian Statistics allows us to derive the unbiased c-M relation successfully.

All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.

You are welcome to nominate speakers to Weimin Yuan (wmy@nao.cas.cn), Mei Zhang (zhangmei@bao.ac.cn), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn), Shude Mao (smao@nao.cas.cn)