



Subaru weak-lensing study of A2163: bimodal mass structure

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We present a weak-lensing analysis of the merging cluster A2163 using Subaru/Suprime-Cam and CFHT/Mega-Cam data and discuss the dynamics of this cluster merger, based on complementary weak-lensing, X-ray, and optical spectroscopic datasets. From two dimensional multi-component weak-lensing analysis, we reveal that the cluster mass distribution is well described by three main components, including a two component main cluster A2163-A with mass ratio 1:8, and its cluster satellite A2163-B. The bimodal mass distribution in A2163-A is similar to the galaxy density distribution, but appears as spatially segregated from the brightest X-ray emitting gas region. We discuss the possible origins of this gas-dark matter offset and suggest the gas core of the A2163-A subcluster has been stripped away by ram pressure from its dark matter component. The survival of this gas core to the tidal forces exerted by the main cluster let us infer a subcluster accretion with a non-zero impact parameter. Dominated by the most massive component of A2163-A, the mass distribution of A2163 is well described by a universal Navarro-Frenk-White profile as shown by a one-dimensional tangential shear analysis, while the singular-isothermal sphere profile is strongly ruled out. Comparing this cluster mass profile with profiles derived assuming intracluster medium hydrostatic equilibrium (H.E.) in two opposite regions of the cluster atmosphere has allowed us to confirm the prediction of a departure from H.E. in the eastern cluster side, presumably due to shock heating. Yielding a cluster mass estimate of $M_{500} = 11.18_{-1.46}^{+1.64} \times 10^{14} h^{-1} M_{\text{sun}}$, our mass profile confirm the exceptionally high mass of A2163, consistent with previous analyses relying on the cluster dynamical analysis and Y_x mass proxy.

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