Title: CENTRAL SURFACE BRIGHTNESS PROFILES AND THE ROLE OF MASSIVE BLACK HOLES IN BRIGHTEST CLUSTER GALAXIES

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Abstract

We present results from an HST WFPC2 I-band imaging study of the centers of 83 brightest cluster galaxies (BCGs). The images show a rich variety of morphological features, including multiple or double nuclei, dust, stellar disks, point source nuclei, and central surface brightness depressions. It was possible to derive high resolution surface brightness profiles for 61 galaxies. Of those, 87% have well-resolved cores. Thirteen percent of the BCG sample lacks a well-resolved core; most of these BCGs have ``power-law'' profiles. These results support the idea that the central structure of early-type galaxies is bimodal in its physical properties. The results also suggest, somewhat surprisingly, that there exist high luminosity galaxies with power-law profiles (or unusually small cores). A correlation between the power-law BCGs and the so-called alpha parameter, related to the slope of the surface brightness profile at a large radius, is consistent with numerical simulations which show that the luminosities and alpha values of BCGs grow with time as a result of accretion. This suggests a scenario in which elliptical galaxies evolve from power-law profiles to core-profiles through accretion and merging. This is consistent with theoretical scenarios that invoke the formation of massive black hole binaries during merger events.