

HOT CORONAE AROUND EARLY-TYPE GALAXIES: EVIDENCE FOR DARK HALOS

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ABSTRACT. The analysis of the X-ray emission from a sample of 55 bright early-type galaxies shows that hot gaseous coronae are a common and perhaps ubiquitous feature of such systems. The X-ray emission can be explained most naturally as thermal bremsstrahlung from hot gas ($kT \approx 0.5$ – 1.5 keV) which may be accumulated from mass loss during normal stellar evolution. The presence of these coronae shows that matter (10^9 – $10^{10} M_{\odot}$) previously thought to be expelled in a galactic wind is instead stored in a hot galactic corona which may be heated and powered by supernova explosions. Perhaps the single most important feature of these coronae is that they provide a unique tracer of the gravitational potential in the outer regions of bright early-type galaxies. In this paper we describe the X-ray properties of these coronae (gas mass, temperature, and extent) and discuss their implications for the presence of massive dark halos around individual early-type galaxies. We find total masses of early-type galaxies up to $5 \times 10^{12} M_{\odot}$. We estimate mass-to-light ratios for early-type galaxies and find values up to ~ 100 (in solar units), similar to those found for the larger dynamical systems of groups and clusters.
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