Extended X-ray emission from early-type Galaxies: Comparison with optical

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In this poster we display the results from a detailed analysis of the distribution of the X-ray emission in early type galaxies. Two major results have come out of the analysis so far:

a) The surface brightness radial profiles of isolated elliptical and S0 galaxies are smoothly decreasing functions of radius out to a R_{max} (similar to the optical radius). Outside R_{max} a flattening in the slope is observed, although the exact shape of the profiles at large radii, where the data are poorest, cannot be determined at present.

b) For $R \ll R_{max}$, the X-ray and optical surface brightness profiles are similar (the nuclear region could be an exception). At larger radii, the X-ray profile could be flatter (NGC 4649 and NGC 4472 northern sector) or steeper (NGC 4472 southern sector) than the optical profile, or have a similar shape (NGC 4636).

It is likely that the different profiles reflect the action of slightly different environments and/or a different ambient density around each galaxy, combined with the "history" of each galaxy. The tail in NGC 4472 could be the result of the motion of this galaxy in a dense intracluster medium. The X-ray deficiency in NGC 4649 could be due to either ram pressure stripping or the action of wind in the outer regions of the galaxy.

The flat profiles observed at large radii suggest the interaction with an external medium that pressure confines the interstellar gas. This complicates the simple assumption that the hot gas is a tracer of the binding mass at large radii. Moreover, the lack of direct measurements of the temperatures and temperatures gradients (or of a unique model that can be applied to the X-ray data) introduces a large uncertainty in the determination of the binding mass even at radii where the hydrostatic equilibrium approximation should hold. However, the X-ray data can be used to obtain an independent measure of the total mass of elliptical galaxies. As already suggested by the optical data, the mass-to-light ratios are higher than expected from the stellar component of these objects, thus suggesting the presence of non-luminous matter also in early type galaxies.

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