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Metal abundances in the hot ISM of early-type galaxies

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Understanding the process of metal enrichment is one of the key problems for our picture of structure formation and evolution, in which early-type galaxies are a crucial ingredient. X-ray observations provide a powerful tool for measuring the metal distributions in their hot ISM, which is shaped by their entire history of star-formation, evolution and feedback. In Fig 1 (left panel), we summarize the results of a Chandra survey of metals in early-type galaxies, supplemented with Suzaku data (Humphrey & Buote 2006, P. Humphrey *et al.*, in prep.). Chandra is particularly suited to this study, as it enables temperature gradients and X-ray point sources to be resolved, mitigating two important sources of bias (e.g., Buote & Fabian 1998; Fabbiano *et al.* 1994). We found on average that the ISM is at least as metal-rich as the stars, and we did not find the problematical, highly sub-solar, abundances historically reported. The abundance ratios of O, Ne, Mg, Si and S with respect to Fe are similar to the centres of massive groups and clusters, suggesting homology in the enrichment process over a wide mass range. Finally, using high-quality Suzaku data, we were able to resolve, for the first time in a galaxy-scale ($\lesssim 10^{13} M_\odot$) object, a radial abundance gradient similar to those seen in some bright galaxy groups (Fig. 1, right panel).

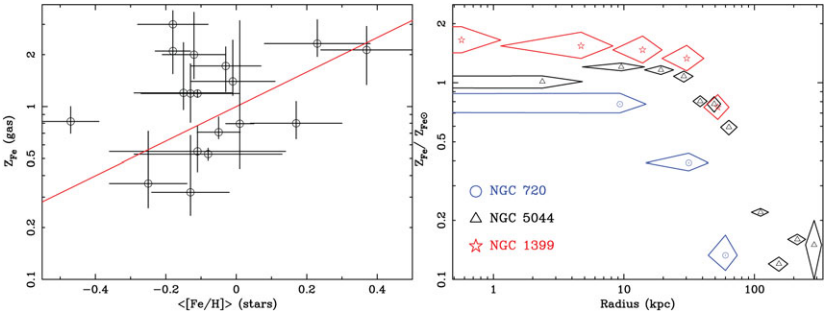

Figure 1. Left: Comparison of the ISM and stellar abundances for a sample of early-type galaxies (Humphrey & Buote 2006, P. Humphrey *et al.*, in prep.). The solid line denotes "y = x". **Right:** Radial abundance gradients for the galaxy groups NGC 1399 and NGC 5044 (Buote *et al.* 2003, 2004) and the isolated elliptical galaxy NGC 720 (P. Humphrey *et al.*, in prep.).

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