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Hot gas flows on global and nuclear galactic scales

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Abstract. One of the most significant observational improvements allowed by the high quality *Chandra* data of galaxies is the measurement of the nuclear luminosities down to low values, and of the hot ISM properties down to very low gas contents. I present here some recent developements concerning the possibility of accreting and outflowing gas, based on modeling results that take into account the role of a central supermassive black hole (MBH).

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Recently, the interaction of the energy output from a central MBH with the interstellar medium (ISM) has been studied with high resolution 1D hydrodynamical simulations, including a detailed treatment of the radiative energy output and its transfer within the ISM, and of the mechanical energy output from AGN winds and jets (Ciotti, Ostriker & Proga 2009). We briefly report here the observational properties of this class of models in the X-ray band at the present epoch from a preliminary investigation (see also Pellegrini, Ciotti & Ostriker 2009).

For a bright ($L_B = 5 \times 10^{10} L_{B,\odot}$) isolated galaxy and standard assumptions concerning the stellar mass loss and SNIa rate, and the stellar and dark mass profiles, the radiative and AGN winds feedback lead to a hot ISM luminosity on the lower end of the large range observed. An external medium, as that of the outer regions of the Virgo cluster, can increase this luminosity by a factor of a few. It also causes (brief) nuclear outbursts to repeat until present epoch. The gas is inflowing within $\sim$ 100 pc, producing a mass accretion rate on the MBH within the low radiative efficiency ADAF regime ($\dot{M}/\dot{M}_{Edd} \sim 10^{-4}$); the nuclear luminosity though ($L_{bol,nuc} \sim$ few$\times 10^{41}$ erg s^{-1} at the present epoch) is quite higher than typically observed (Pellegrini 2005a,b). Mechanical feedback from a jet can lower $L_{bol,nuc}$ to values common for early type galaxies of the local universe ($L_{bol,nuc}/L_{Edd} \sim 10^{-7} - 10^{-8}$). It also makes the nuclear outbursts less strong and rarer. The brightness profile of the hot gas can have a variety of shapes, depending on the recent flow history, the external medium and the jet heating. The temperature profile has a negative gradient, the external medium and the jet both make this profile flatter.

References

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