



Anti-hierarchical Evolution of AGN



The evolution of AGN shows a strong dependence on X-ray luminosity. The space density of high-luminosity AGN reaches a peak around $z \sim 2$, similar to that of optically selected QSO, while the space density of low-luminosity AGNs peaks at redshifts below $z < 1$. New ingredients in structure formation models are necessary to understand this anti-hierarchical behaviour.

Using ~ 1000 AGN from ROSAT, XMM-Newton and Chandra surveys (Figure 1) we are able to derive reliable space densities for low-luminosity (Seyfert-type) X-ray sources at cosmological redshifts for the first time. The evolution of the luminosity function (Figure 2) can only be described by luminosity-dependent density evolution and is much less at low X-ray luminosities.

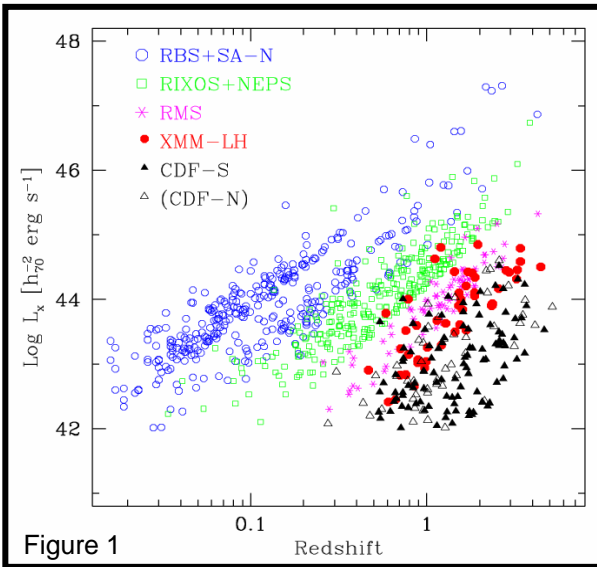


Figure 1

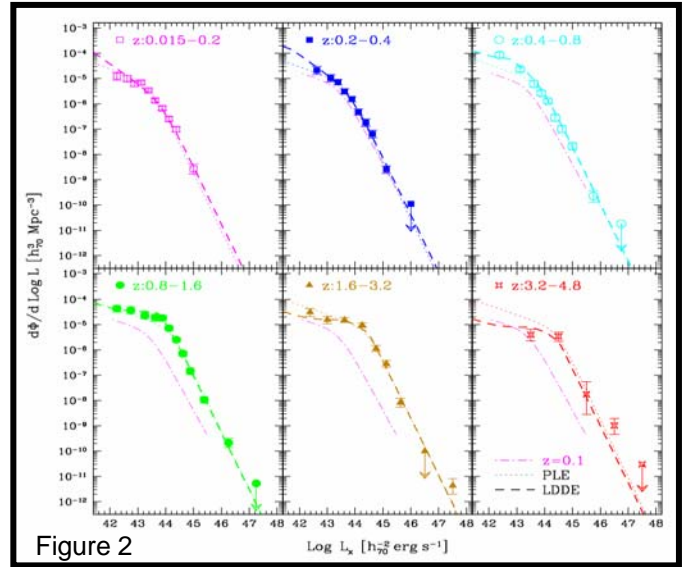


Figure 2

The space density plotted as a function of redshift (Figure 3) peaks at much lower redshifts for lower-luminosity sources, implying an anti-hierarchical black hole growth. Using a rigorous treatment of the optical identification completeness we can show that the space density of AGN with X-ray luminosities $L_x < 10^{45}$ erg s^{-1} declines significantly towards high redshifts. For $L_x = 10^{44-45}$ erg s^{-1} the high-redshift decline is consistent with that of the optical QSO samples (Figure 4).

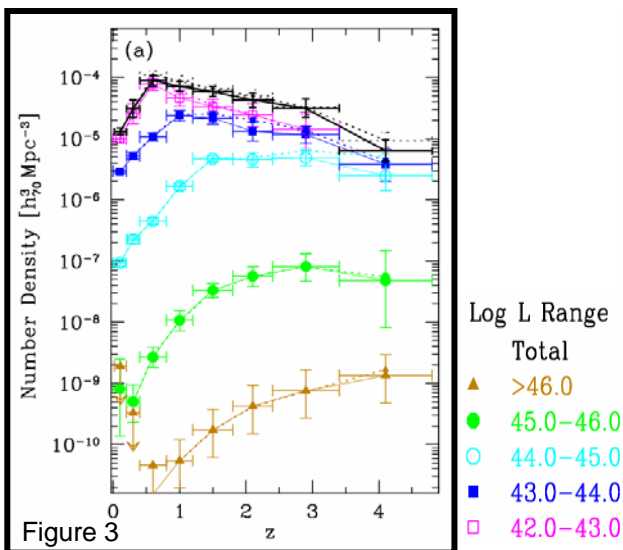


Figure 3

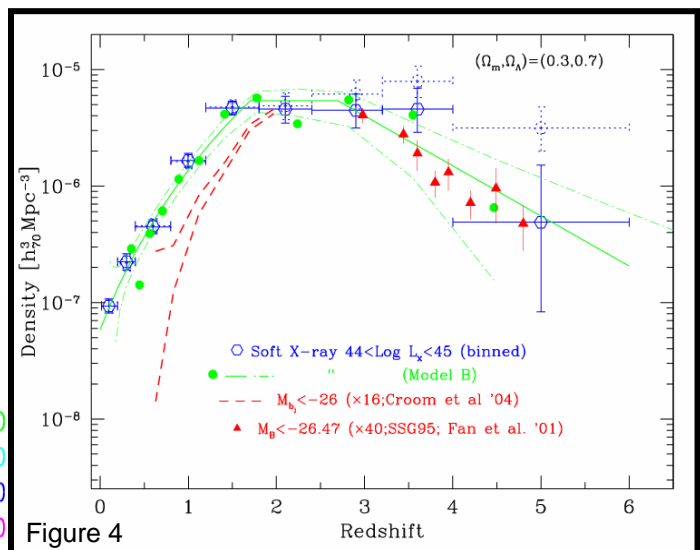


Figure 4