

ON THE WAY AGN'S TURN OFF

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Observations of nearby galaxies indicate non-negligible (dark) mass in their nuclei, interpreted either as very dense clusters or Massive Black Holes (MBH's). The latter hypothesis is supported by the widespread idea that MBH's can be the engine powering Active Galactic Nuclei (AGN's), and that interaction- or bar-induced central mass accretion can feed MBH's with large scale, plentiful fuel. However, there are fewer AGN's at the present time than at high redshifts, although many if not all bright galaxies must harbour relics of central active MBH's. How can we explain the fact that some AGN's are now turned off? Is it only due to the exhaustion or evaporation of the available fuel, and/or to the lower rate of interactions at the present epoch?

An alternative possibility stemming from the MBH - bar - fueling connections is suggested. 1) Interactions do not exclusively induce starbursts and/or AGN's. In strongly barred galaxies, significant large scale, bar-induced mass accretion occurs as well ^[1], and mass transport to the very centre can be produced by a system of embedded bars with different pattern speeds ^[2]. 2) Since mass concentrations in the nucleus lead to the generation of chaos, MBH's are not innocuous for the global galactic dynamics. The self-consistent response of the potential acts to minimise this chaos and the central region tends to become nearly spherical. When the mass of the MBH reaches about 2% of the stellar disc mass, the bar is destroyed ^[3]. 3) The bar dissolution results in a drastic reduction of both the angular momentum transfer and the dissipation rate, and gas fueling switches off.

Thus, the existence of these turned off AGN's could be explained in part by the complete dissolution of the bars by supermassive black holes. Except in the unlikely event that the fuel is completely exhausted or evaporated, sporadic accretion of small amounts of local matter remains possible at any time. Finally, since the bar dissolution will usually occur in evolved thick bars, MBH's candidates for the upper end of the black hole mass function should preferably be searched in SO or Sa galaxies, some of which may result from dissolved thick bars ^[1]. Such galaxies would be excellent candidates for turned off quasars or Seyferts.

References

- [1] Friedli, D., Benz, W., 1993, *A&A* 268, 65
- [2] Friedli, D., Martinet, L., 1993, *A&A*, 277, 27
- [3] Friedli, D., 1993, in: *Mass-Transfer Induced Activity in Galaxies*, Lexington Conference, ed. I. Shlosman. Cambridge University Press, Cambridge, in press