Astrophysics Seminar

Prospects for X-ray constraints on the local super-massive black hole occupation fraction

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An issue of crucial relevance in understanding the connection between super-massive black holes and their host galaxies is the "occupation fraction" of massive black holes in the present day universe. While the occupation fraction is expected to be close to 100% in high mass galaxies, predictions differ dramatically at the low mass end, with "light" seeds (i.e. remnants from the first generation of stars) producing a greater nuclear occupation fraction compared to direct collapse models below a few billion solar masses. For an unbiased sample, the local active fraction represents a strong lower limit to the occupation fraction, and X-ray observations of nearby, formally inactive galaxies over a wide range in stellar masses can provide observational constraints to the very mechanism by which the first black holes formed. Adopting a Monte Carlo approach, we make use of the Chandra AMUSE-surveys to characterize simultaneously the black hole occupation fraction and the scaling of nuclear activity with host mass. Further, we discuss future prospects for improving the precision of these parameters as a function of sample size, as well as desired sensitivity and spatial resolution of future missions.

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