

Título/Title:

ATHENA simulations

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Descrição/Description:

Super-Massive Black Holes ($M_{\bullet} > 1e6 M_{\odot}$; SMBHs) are probably present at the center of most galaxies. The growth of such massive objects occurs during episodic accretion phases of gas - liberating in the process large amounts of energy that in many cases outshine the light of all stars in the host galaxy - and that can greatly influence its evolution. SMBHs in such phases are called Active Galactic Nuclei (AGN) and might have a predominant role in theories for galaxy evolution. Two critical aspects of AGN are currently largely unconstrained: how these black holes initially formed - the original seeds - and what are the physical mechanism that dominate the impact of the AGN on its host galaxy. AGN are predominantly selected based on their X-ray emission as they are the only powerful and continuous sources at such energies. Therefore, the future ESA mission Athena - a space telescope with the capability to focus X-ray photons - aims to answer these and many other questions related to the high energetic Universe thanks to the significant improvements over its predecessors; XMM-Newton and Chandra.. Athena is expected to be launch into an L2 orbit in the early 2030's and will reach by the end of 2019 the mission adoption stage. The IA is significantly involved in the WFI instrument with a strong interest on the instrument simulations. At this stage is critical to be able to simulate the most representative X-ray sky to be seen by Athena, as the type and numbers of sources to be detected will significantly impact the achievement of the WFI mission key goals.

GOALS:

The main student's goal would be to:

1. Derive a complete catalog of X-ray sources (over several sq. degrees of sky) based on the expectations of the most recent cosmological simulations recently published by the IA AGN group (Samarantidis et al. 2019);
2. Using the SIXTE X-ray telescope simulator for ATHENA/WFI, estimate the minimum observing time necessary to achieve the fundamental goals of the mission.

During this 3 month period, the student will acquire a basic understanding of AGNs, their X-ray emission and their importance in galaxy evolution. She or he will also be introduced to key concepts of the development, design and working properties of an X-ray telescope.