Harnessing the spin of supermassive black holes with Athena

The spin of the supermassive black holes lying at the centre of active galactic nuclei holds the answer to several key questions in the field of galaxy evolution, involving SMBH growth history, radiative efficiency, onset and implications of AGN feedback. None the less, the accuracy of the different SMBH spin measurement methods and the reliability of the spin estimates achieved so far are still the subject of controversy and debate. Through an innovative and extensive approach based on simulations and blind spectral analysis, we have recently shown that X-ray reflection signatures remain the most powerful diagnostics of SMBH spin even in the presence of high spectral complexity, provided that the inner disc is efficiently illuminated by the X-ray corona. This implies, on the other hand, that the current X-ray facilities are almost exclusively sensitive to the extreme gravity regime. With its much larger effective area and higher energy resolution, Athena will overcome these limitations by revealing any fine structures in the Fe-K emission feature, thus probing the emissivity profile of the accretion disc and the nature of the X-ray corona itself, leading us into the era of high-precision SMBH spin measurements.