Black Holes and the Fate of the Universe
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The first stellar mass black holes probably formed in powerful gamma ray bursts in the early Universe. Stellar remnants of the first generation of stars have been the seeds of supermassive black holes, which we find dormant in the centers of most nearby galaxies, including our own Milky Way.

Different feeding modes have been identified for growing black holes. Small flares occur almost daily in our Galactic Center black hole. In major flares, an otherwise dormant black hole tidally disrupts and swallows a normal star. Major mergers between two galaxies seem to play an important role in the feeding of black holes. In the nearby NGC 6240, which consists of a merger between two smaller galaxies, we can identify a double supermassive black hole in a single galaxy, which will merge in the future. A tight correlation between black hole mass and the global properties of their host galaxies indicates a co-formation and evolution of black holes and galaxies.

The X-ray sky is dominated by a diffuse extragalactic background radiation, which can almost completely be resolved into discrete sources using X-ray satellites. With them, we observe the growth phase of the population of supermassive black holes throughout the history of the Universe. A new generation of upcoming astronomical observatories will be perfectly suited to discovering and studying in detail the earliest objects.

What will be the fate of these black holes? They can live much longer than other forms of matter and structures in the Universe, but nevertheless must evaporate after a finite time. If dark energy indeed accelerates the expansion of the Universe forever, the most massive black holes may grow to hundreds of billions of solar masses, which can live as long as $10^{100}$ years, a truly unimaginable time span. The first compact objects to enter the stage of the Universe will then also be the last ones to leave it.