

HUNTING FOR HIDDEN FEEDING MONSTERS IN GALAXIES

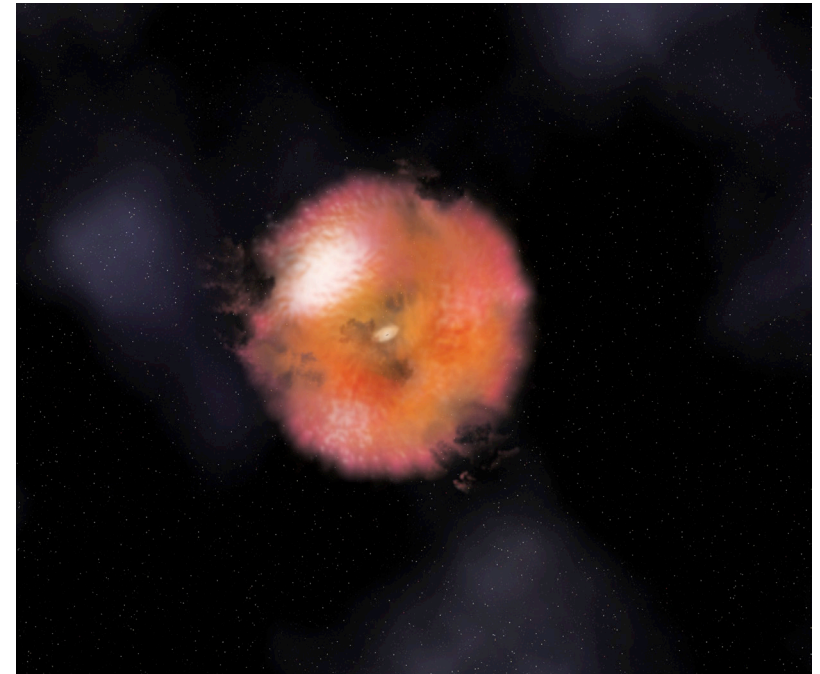


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In recent years astronomers have been puzzled by a tantalizing result. All nearby massive galaxies host in their center a super massive black hole whose mass, typically of a million suns or more, is proportional to that of the stars in central parts of the galaxies. This strong connection holds despite the vastly different scales involved, with the size of the black holes to that of the central region of the galaxy (light minutes to thousands of light years) being the same ratio between a bacterium and the Empire State Building. Because the growth of galaxies via star formation and the build-up of massive black holes via accumulation of matter (accretion) are proceeding in parallel with cosmic time, it is thought that both processes are closely interrelated, either because they influence each other or because a third mechanism controls both of them.

To solve this mystery, we need to find and weight the massive black holes in galaxies at the times when most of the action happened from both sides, at redshifts $z \sim 1-3$. Most of the energy liberated in the Universe by accretion on supermassive black holes (typically more than a million times the Sun's luminosity) comes from sites that are heavily absorbed and, hence, this energy escapes direct detection in most wavelengths, but not in X-rays. Uncovering (and accounting for) these X-ray shining monsters gorging themselves in the matter of their host galaxies is one of the main objectives of Athena.

With its paramount sensitivity in X-rays and its wide field of view, Athena is uniquely suited to pinpoint these feeding beasts among the myriad of galaxies present in a typical astronomical image, including many of the most heavily obscured ones: her target are massive black hole swallowing 50 to tens of thousands of Earth masses per year. By surveying the X-ray sky, Athena will complete the census of these enigmatic sources, contributing decisively to solve the riddle of the formation and evolution of galaxies in symbiosis with their gargantuan nuclei.



Artistic impression of material falling into a supermassive black hole in the centre of a galaxy (not to scale) (Credits: NASA/Aurore Simonnet, Sonoma State University).