

APR05-2005-000769

Abstract for an Invited Paper
for the APR05 Meeting of
the American Physical Society

A Detailed X-ray View of High-Energy Activity in the Galactic Center¹

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Over the past six years, the Chandra X-ray Observatory has repeatedly observed Sagittarius (Sgr) A*, the compact non-thermal radio source and supermassive black hole at the dynamical center of our Milky Way Galaxy. The combined deep exposure coupled with Chandra's 0.5-arcsecond resolution have produced the most sensitive X-ray image of our Galactic center, allowing us to study the central black hole and its environment in unprecedented detail. Sgr A* is extremely faint in X-rays, radiating about 11 orders of magnitude below the Eddington limit, despite the abundant supply of fuel provided by the strong winds emanating from a cluster of young, massive stars in the central parsec. The properties of this X-ray emission will be discussed, along with the emission from surrounding stars, supernovae, and other structures in the central parsecs of the Galaxy, including the recent discovery of an overabundance of X-ray transients within the central parsec that provides evidence for the existence of a swarm of stellar-mass black hole and neutron star X-ray binaries surrounding the supermassive black hole. In October 2000, Chandra discovered a rapid, large-amplitude X-ray flare from Sgr A*. This extreme activity was totally unexpected. Chandra and XMM-Newton have since shown that Sgr A* flares in X-rays on a daily basis. NIR flares have been discovered within the last year at about three times the rate of the X-ray flares, raising the question of whether the X-ray and NIR flares are produced by the same or different processes. I will present results from the first simultaneous detection of an X-ray and NIR flare from Sgr A*. At least in this case, the X-rays and NIR photons appear to arise from the same electron population.

¹This work was supported in part by NASA through Chandra Award Number GO2-3115A.