POSTER (late submission): ARCUS: EXPLORING THE FORMATION AND EVOLUTION OF CLUSTERS, GALAXIES, AND STARS

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The Arcus MIDEX Explorer, which NASA selected for a Phase A study in August 2017, provides high-resolution soft X-ray spectroscopy in the 12-50Å bandpass with unprecedented sensitivity. Its capabilities include spectral resolution >2500 and effective areas in the range 200-400 cm^2. The three top science goals for Arcus are (1) to measure the effects of structure formation imprinted upon the hot baryons that are predicted to lie in extended halos around galaxies, groups, and clusters, (2) to trace the propagation of outflowing mass, energy, and momentum from the vicinity of the black hole to extragalactic scales as a measure of their feedback and (3) to explore how stars, circumstellar disks and exoplanet atmospheres form and evolve. Arcus relies upon the same 12m focal length grazing-incidence silicon pore X-ray optics (SPO) that ESA has developed for the Athena mission; the focal length is achieved on orbit via an extendable optical bench. The focused X-rays from these optics are diffracted by high-efficiency Critical-Angle Transmission (CAT) gratings, and the results are imaged with flight-proven CCD detectors and electronics. The power and telemetry requirements on the spacecraft are modest and mission operations are straightforward, as most observations will be long (~100 ksec), uninterrupted, and pre-planned.