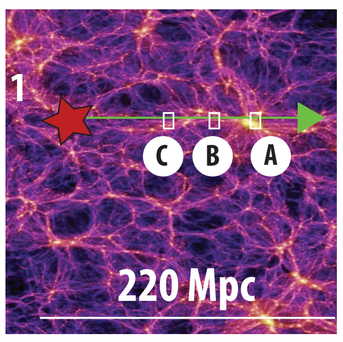
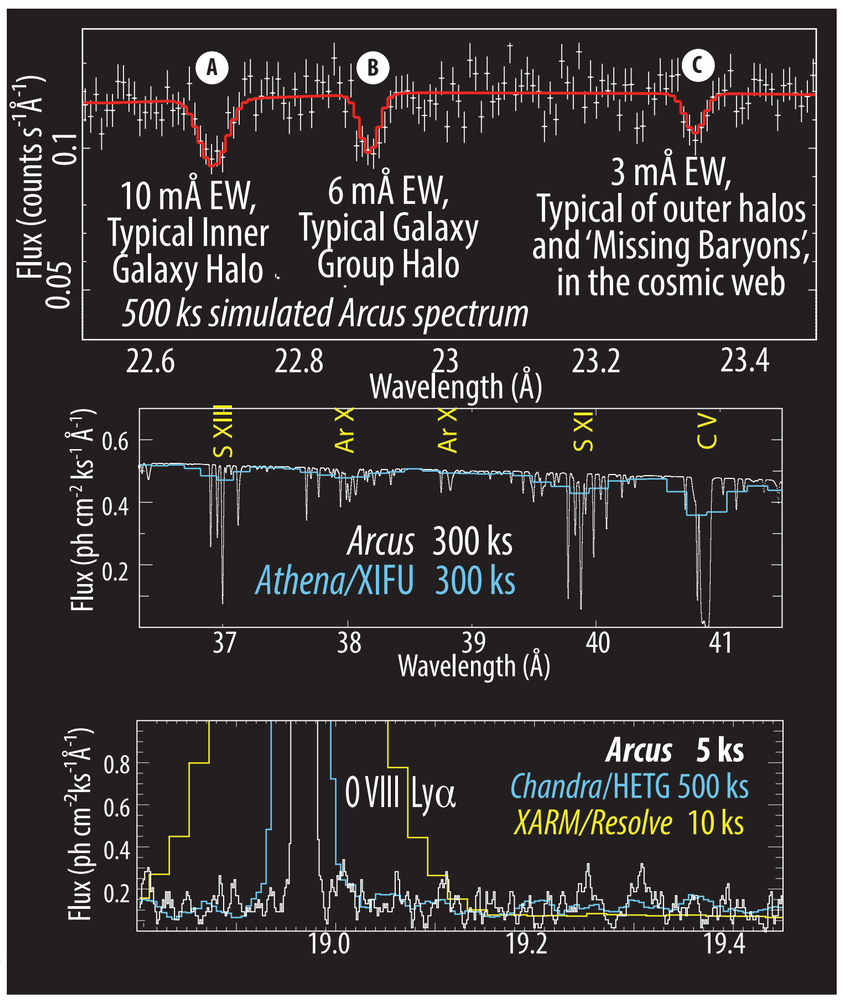
The Arcus X-ray Grating Spectroscopy Explorer

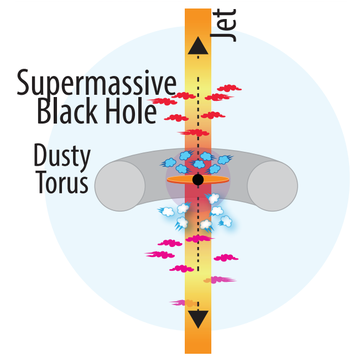
Exploring the Formation and Evolution of Clusters, Galaxies, and Stars

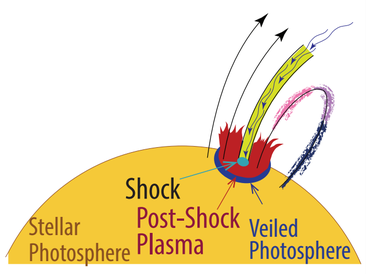
Randall Smith for the Arcus Team

Three key science objectives enabled by soft X-ray bandpass with high sensitivity and resolution









Find the Universe's missing baryons and metals

Measure the spatial and temperature distribution of hot gas at and beyond the virial radii of galaxies and clusters, and the distribution and metal abundance of all phases of gas in our Galaxy disk

Show how black holes impact surroundings

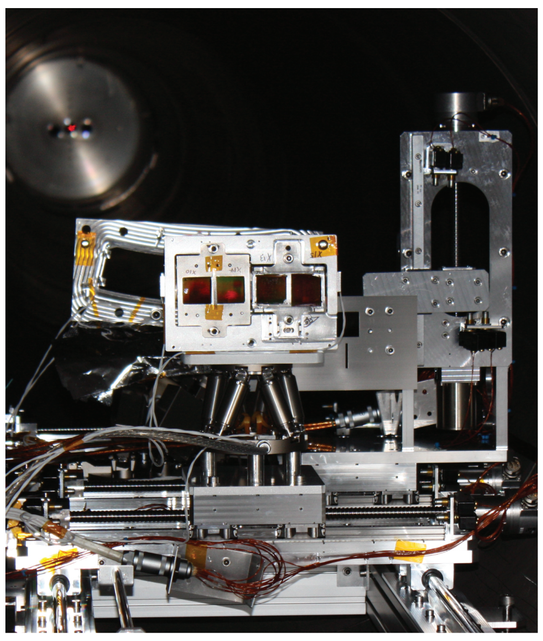
Measure the mass, energy, and composition of out-flowing winds from the inner regions of supermassive and stellar mass black holes

Learn how stars & stellar systems form & evolve

Measure the thermodynamic properties of hot gas in stellar magnetic structures and shocks; measure outer radial density profiles of exoplanet atmospheres

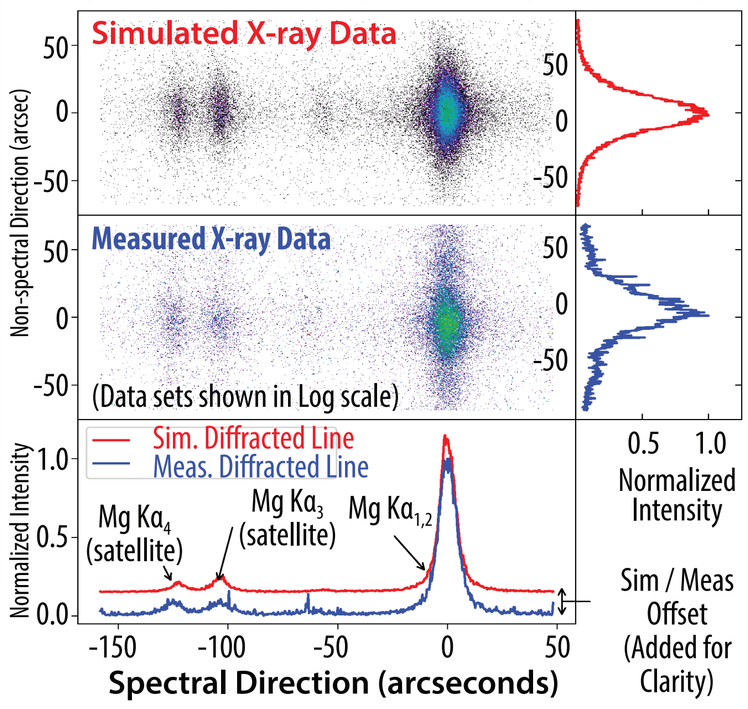
Two New Technologies, Silicon Pore Optics (SPO) and Critical-Angle Transmission (CAT) Gratings, Demonstrated at PANTER Beamline

Aligned SPO & CAT gratings: Prediction vs Test Results

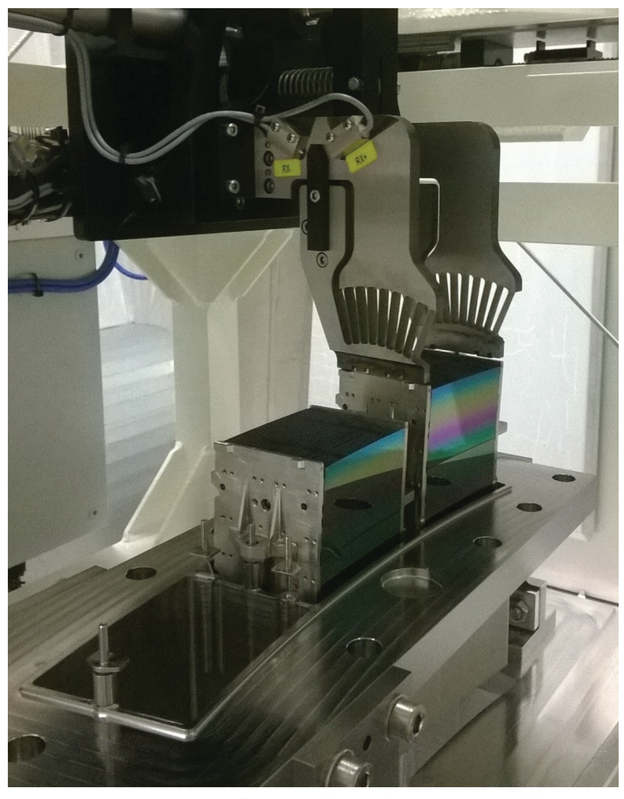


Grating Window Alignment Test at Panter - April 2018

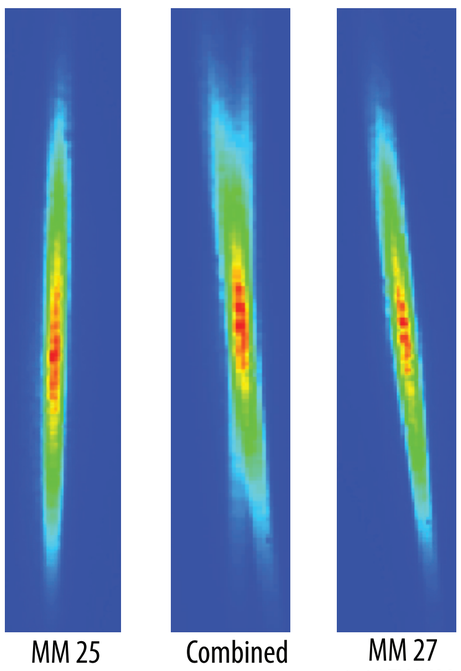
Simulated and Measured X-ray Data from GWAT
(2 Coaligned SPO MM's and 4 Coaligned CAT Gratings) 14th Order Mg Kα



SPO MM Co-Alignment



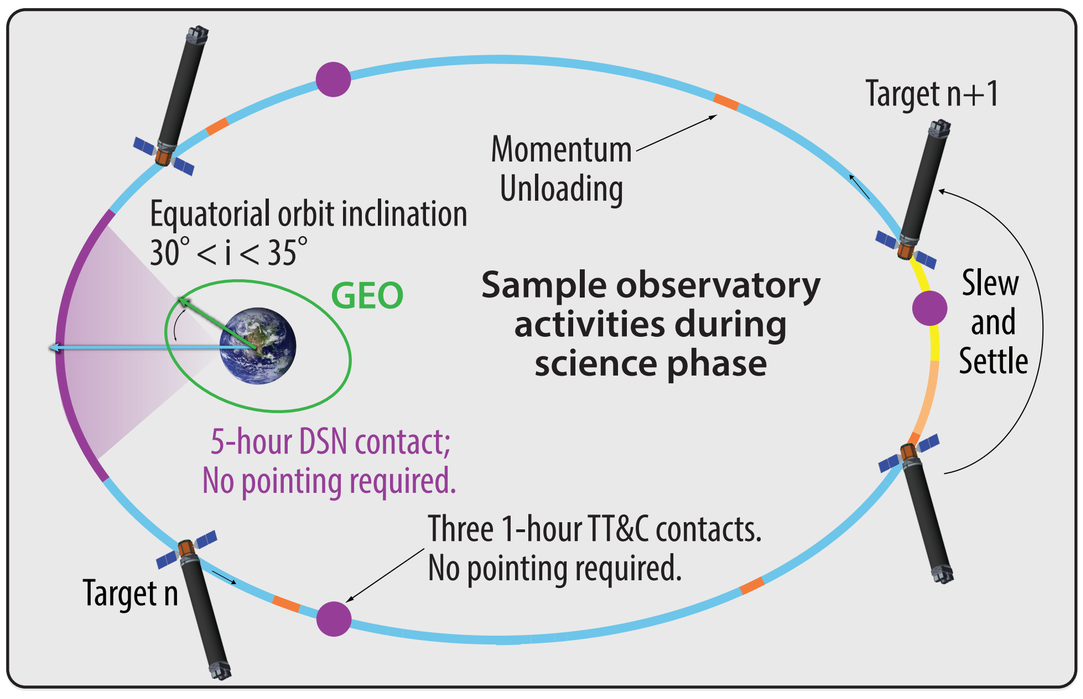
SPO MMs aligned and mounted by Media Lario, later used in Arcus test

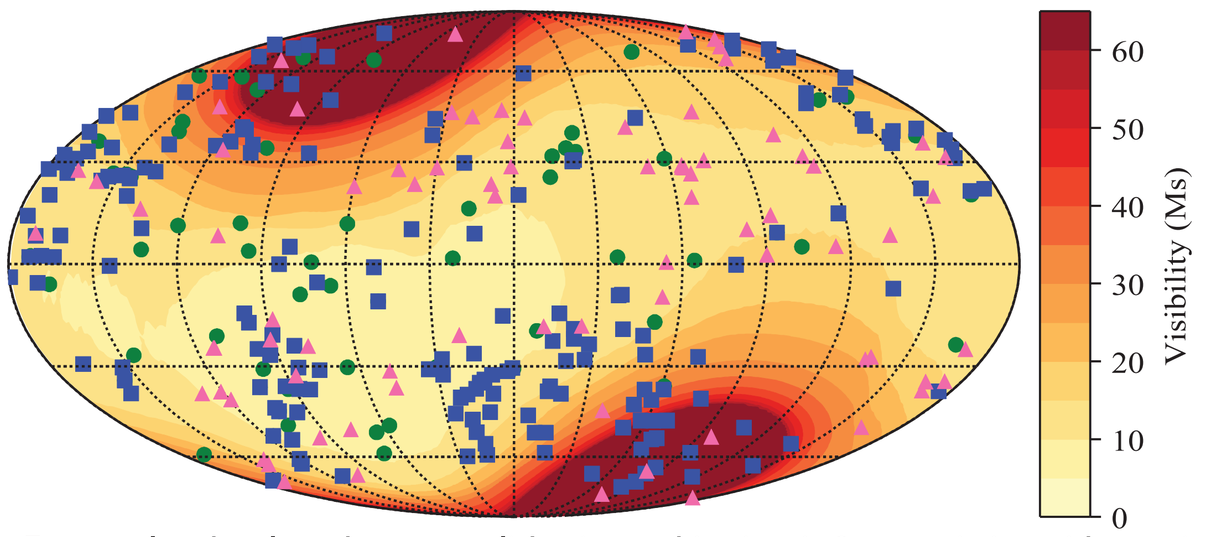


Measured SPO MM PSF (measured at Media Lario)

High Earth Orbit Together with Broad Field of Regard Enables Straightforward Mission Operations and Regular Access to Entire Sky

High-Earth 6.8 day Lunar Resonant Orbit provides stable environment allowing long uninterrupted pointings with low mission operations costs.





Targets already selected to accomplish science objectives in 2-year mission with margin. Spacecraft and instrument designed for 5+ year lifetime, providing NASA an option for mission extension with GOs after completion of primary objectives.