Hubble Space Telescope

Cycle 17 GTO/COS Proposal

COS-GTO: Spatial Distribution of Io's Atmosphere

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Scientific Category: SOLAR SYSTEM

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Abstract

We will use six HST orbits with COS to observe the disk-integrated longitudinal distribution of Io's atmosphere, and ten HST orbits with STIS to provide complementary disk-resolved information at key locations. We will use the COS G225M grating to observe four SO2 absorption bands, which can be used to determine SO2 atmospheric density. Disk-integrated 19 micron observations of the atmosphere indicate that the anti-Jupiter hemisphere of Io has an atmospheric density roughly ten times greater than the Jupiter-facing side (Spencer et al. 2005), and mm-wave observations suggest a similar pattern. However the infrared and mm-wave observations cannot easily separate atmospheric density from atmospheric temperature, so these results are model-dependent. Sparse 2100-2300Å disk-resolved observations (McGrath et al. 2000, Jessup et al. 2004) tell a consistent story, but do not cover enough of Ioês surface to provide full confirmation of the long-wavelength result. We will therefore observe Io's disk-integrated atmospheric density at six longitudes, roughly 30, 90, 150, 210, 270, and 330 W, to confirm the 19 micron results and improve our ability to model the 19-micron data. With STIS, we plan disk-resolved 2000-3200Å spectroscopy of Io's SO2 atmosphere on its leading hemisphere (centered near longitude 90), to improve the models further by constraining the latitudinal distribution of the atmosphere, which cannot be resolved by COS. Our observations will target regions away from active plumes (in contrast to our Cycle 10 observations (Jessup et al. 2004) which targeted the Prometheus plume).

Investigators:

	Investigator	Institution	Country
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Number of investigators: 2

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Target Summary:

Target	RA	Dec	Magnitude
IO			V = 5.5 +/- 1.0, F(2900) = 50 kR

Observing Summary:

Target	Config Mode and Spectral Elements	Flags	Orbits
IO	COS/NUV Spectroscopic G225M		6 (1x6)
IO	STIS/NUV-MAMA Spectroscopic G230L		10 (5x2)

Total prime orbits: 16

This is a COS GTO project, no scientific justification is needed.