13840 - The Smith Cloud: Galactic or Extragalactic?
Cycle: 22, Proposal Category: GO
(UV Initiative)
(Availability Mode: SUPPORTED)

INVESTIGATORS

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<tr>
<th>Name</th>
<th>Institution</th>
<th>E-Mail</th>
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<tbody>
<tr>
<td>Dr. Andrew J. Fox (PI) (ESA Member) (Contact)</td>
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</tr>
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</tr>
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<td>University of North Carolina at Chapel Hill</td>
<td><a href="mailto:dstark@email.unc.edu">dstark@email.unc.edu</a></td>
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<td>The Johns Hopkins University</td>
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<tr>
<td>Dr. Robert A. Benjamin (Col)</td>
<td>University of Wisconsin - Whitewater</td>
<td><a href="mailto:benjamir@uww.edu">benjamir@uww.edu</a></td>
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**ABSTRACT**

The Milky Way is surrounded by a population of gaseous high-velocity clouds (HVCs), which play an important role in bringing fresh fuel for star formation into the disk. The Smith Cloud is an HVC in an advanced state of accretion, only ~30 Myr away from impacting the Galactic plane. It is unique among HVCs in having a known distance (12.4 kpc) and a well-constrained 3D velocity (300 km/s), but we do not yet know its metallicity, which would distinguish between Galactic (metal-enriched) and extragalactic (metal-poor) origins. Here we propose a program to measure the Smith Cloud's metallicity using HST/COS spectra of three AGN lying behind the Cloud and its wake. Combining the UV metal-line (O I and S II) column densities with existing H I column densities will lead to precise abundance measurements for the Smith Cloud, directly constraining its origin. In addition, the relative strength of depleted (Fe II, Si II) to undepleted (S II) UV absorption lines will be used to infer its dust content. Finally, we will search for variation in the ionization level and kinematics between the three sight lines, which would indicate a disruptive encounter with the hot Galactic corona.

**OBSERVING DESCRIPTION**

This is a nine-orbit COS/G130M spectroscopic program to study the chemical and physical properties of the Smith Cloud, a high-velocity cloud (HVC) falling onto the Galactic disk. The program observes three QSOs, with a single three-orbit visit on each QSO. Each target is fairly faint in the UV, with F_1300 between 0.5e-14 and 0.8e-14 erg/cm^2/s^-1/Å^-1, so there are no bright-object concerns (all three fields pass BOT checks with both GSC II and GALEX catalogs). All four FP-POS positions are used within each visit with the 1291 CENWAVE setting.
### Proposal 13840 - PG2112+059 (01) - The Smith Cloud: Galactic or Extragalactic?

#### Scientific Instruments: COS/FUV

#### Special Requirements: (none)

#### Diagnostic Status: No Diagnostics

**Fixed Targets**

- **Name**: PG2112+059
- **Target Coordinates**: RA: 21 14 52.5871 (318.7191129d)
  Dec: +06 07 42.33 (6.12842d)
- **Equinox**: J2000
- **Fluxes**: V=15.77
  \( F_{1300}=0.75e^{-14} \) (cgs)
- **Reference Frame**: ICRS
- **Comments**: This object was generated by the targetselector and retrieved from the SIMBAD database.

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Comments: SIMBAD coordinates did not match position of target on finder charts. DEC changed by +1.5", RA changed by +0.08s to match target.

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Proposal 13840 - RXJ2043.1+0324 (02) - The Smith Cloud: Galactic or Extragalactic?
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**Comments:** This object was generated by the targetselector and retrieved from the SIMBAD database.

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