# 15669 - Discovering the X-ray Broad Line Region in AGN

Cycle: 26, Proposal Category: GO

(Availability Mode: SUPPORTED)

**INVESTIGATORS**



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**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) MRK-110 | COS/FUV<br>COS/NUV | 2 | 30-May-2019 16:00:24.0 | yes |

2 Total Orbits Used

**ABSTRACT**

Thanks to high resolution spectroscopy, the X-ray emitting broad line region has been recently discovered and studied in few bright type 1 Seyferts. We propose to observe for 120 ks the bright AGN Mrk110, simultaneously with HST-COS. The goal is to model for the first time the panchromatic broad line region emission in a Narrow Line Seyfert~1 galaxy. We will use the broad lines from the optical, UV and X-rays in a global modeling that

will characterize the stratification, extend and ionization of the broad line emitting region, whose Xray extension still awaits a full characterization.

**OBSERVING DESCRIPTION**

We will observe Mrk 110 with HST-COS simultaneously with one of our three XMM-Newton/RGS pointings. With this HST observation we will study as many as 6 broad emission lines (Ly alpha, N V, C II, Si IV, C IV, and He II), which will be the backbone for our modeling of the X-ray broad-line region (XBLR). From our past work, in cases like this where no absorption lines are present, a S/N of 10 in the continuum is adequate to deblend Ly alpha and C IV from the neighboring N V and He II lines.

The historical mean UV flux of Mrk 110 is F(1403 A)=1.3e-14 erg cm-2 s-1 A-1 (Dunn et al. 2006), a faintest observed flux of 1.2e-14, and a brightest observed flux of 1.8e-14. The target poses no bright object risk for any grating spectrum, and its flux is faint enough, even allowing for a factor of two potential brightening beyond its brightest observed flux, to use an imaging target acquisition. To guard against potential acquisition failure in the event the target is fainter than expected, we use an exposure time for Mirror B assuming Mrk 110 is only half as bright as it has ever been observed.

We will use central wavelength setting 1222 for G130M to black geocoronal Ly alpha allowing us to use both detector segments and all four FP-POS positions to cover 1100-1360 A. COS ETC v26.2 gives an exposure time of 1502 s to reach S/N=10 at 1360, near the overlap with grating G160M. We will use grating G160M at central wavelength settings of 1533 and 1589 to cover Si IV, C IV, and He II. Achieving S/N=10 at 1560 in the continuum near C IV requires  2167 s.

## Visit

**Proposal 15669, Visit 01, implementation** Thu May 30 20:00:25 GMT 2019

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 100%

*Comments: Coordinate with 1 of 3 planned XMM-Newton observations.*

## Diagnostics

(Visit 01) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Visit 01) Warning (Orbit Planner): TIMETAG EXPOSURE SHORTENED TO AVOID DATA LOSS

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MRK-110 | RA: 09 25 12.8478 (141.3035325d)<br>Dec: +52 17 10.39 (52.28622d)<br>Equinox: J2000 | Proper Motion RA: -9.80845178840531E-6 sec of time/yr<br>Proper Motion Dec: 8.999999999999999E-6 arcsec/yr<br>Epoch of Position: 2015.5<br>Redshift: 0.035291 | V=16.41+/-0.5<br>1.3e-14 at 1403 A | Reference Frame: ICRS |

*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[BLR, NUCLEUS, SEYFERT]*
*Extended=NO*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (COS.ta.1306643) | (1) MRK-110 | COS/NUV, ACQ/IMAGE, PSA | MIRRORB | | | | 10.3 Secs (10.3 Secs)<br>*[==>]* | <br>***[1]*** |
| *Comments: We use a conservatively long acquisition time (based on a flux lvel of 0.6e-14, half the previously observed minimum) to guard against an acquisition failure in case the target is in an unexpectedly low-flux state.* | | | | | | | | | |
| 2 | (COS.sp.1306649) | (1) MRK-110 | COS/FUV, TIME-TAG, PSA | G130M 1222 A | BUFFER-TIME=1700; FP-POS=ALL | | | 373. Secs (1492 Secs)<br>*[==>(Split 1)]*<br>*[==>(Split 2)]*<br>*[==>(Split 3)]*<br>*[==>(Split 4)]* | <br>***[1]*** |
| 3 | (COS.sp.1306651) | (1) MRK-110 | COS/FUV, TIME-TAG, PSA | G160M 1533 A | BUFFER-TIME=97; FP-POS=3 | | | 207. Secs (207 Secs)<br>*[==>]* | <br>***[1]*** |
| 4 | (COS.sp.1306651) | (1) MRK-110 | COS/FUV, TIME-TAG, PSA | G160M 1533 A | BUFFER-TIME=944; FP-POS=4 | | | 1054. Secs (1054 Secs)<br>*[==>]* | <br>***[2]*** |
| 5 | (COS.sp.1306652) | (1) MRK-110 | COS/FUV, TIME-TAG, PSA | G160M 1589 A | BUFFER-TIME=490; FP-POS=3 | | | 600. Secs (600 Secs)<br>*[==>]* | <br>***[2]*** |
| 6 | (COS.sp.1306652) | (1) MRK-110 | COS/FUV, TIME-TAG, PSA | G160M 1589 A | BUFFER-TIME=490; FP-POS=4 | | | 600. Secs (600 Secs)<br>*[==>]* | <br>***[2]*** |

Orbit Structure