# Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in BHXRBs 

Castro Segura, Noel; Altamirano, Diego; Buisson, Douglas; Degenaar, Nathalie; Diaz Trigo, Maria; Fender, Rob; Higginbottom, Nick; Knigge, Christian; Long, Knox S.; Matthews, James

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## 16489 - Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in BHXRBs

Cycle: 28, 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 <br> with Visit? |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 01 | (1) BHXRB-CANDIDATE | COS/FUV <br> COS/NUV | 3 | $15-M a r-202117: 00: 47.0$ | yes |

Proposal 16489 (STScl Edit Number: 0, Created: Monday, March 15, 2021 at 4:00:51 PM Eastern Standard Time) - Overview

| Visit | Targets used in Visit | Configurations used in Visit | Orbits Used | Last Orbit Planner Run | OP Current <br> with Visit? |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 02 | (1) BHXRB-CANDIDATE | COS/FUV <br> COS/NUV | 3 | $15-M a r-2021$ 17:00:48.0 | yes |
| 03 | (1) BHXRB-CANDIDATE | COS/FUV <br> COS/NUV | COS/FUV <br> COS/NUV | 3 | $15-M a r-202117: 00: 49.0$ |$⿻$| yes |
| :--- |
| 04 |
| (1) BHXRB-CANDIDATE |

12 Total Orbits Used

## ABSTRACT

Transient black-hole X-ray binaries viewed at high inclinations display blue-shifted absorption lines in their X-ray spectra. These features are the signatures of powerful, hot and equatorial accretion disk winds being driven from these systems in their luminous soft states. Remarkably, blueshifted absorption lines have recently also been discovered in optical and NIR recombination lines and ultraviolet resonance features. These features must also be produced in an outflow, but the physical conditions traced by these outflows are different. Despite this, the characteristic Doppler velocities of all three types of signatures are comparable, yet they have never been observed simultaneously. It is therefore completely unclear if they are associated with distinct outflows (e.g. driven by different mechanisms) or simply with different regions/phases within the same outflow. Here, we propose to answer this question by carrying out simultaneous time-resolved spectroscopy of a high-inclination system in the X-ray, ultraviolet and optical bands, in its two distinct physical configurations (hard- and soft-states). This will allow us to test if the three types of wind features are present simultaneously, and, if so, whether they display correlated variability and/or velocity structure.

## OBSERVING DESCRIPTION

We will observe LMXRB in the hard and soft states coordinated with XMM-Newton. Ideally we will have 3 visits, at the begining and end of the XMM exposure, in order to swarch for simultaneous accretion disk winds in the X-ray and FUV.

Given the unknown UV luminosity of the transient I am leaving different observing strategies in this mock phase II.

Once we have a suitable target I will update all this carefully.

Proposal 16489 (STScl Edit Number: 0, Created: Monday, March 15, 2021 at 4:00:51 PM Eastern Standard Time) - Overview
For now the target is Swift J 1858 which is a transient where we triggered similar programs during the past two cycles.

| $\frac{\pi}{5}$ | Proposal 16489, 3orbits COS-FUV G140L template (01), implementation <br> Diagnostic Status: Warning <br> Scientific Instruments: COS/FUV, COS/NUV <br> Special Requirements: SCHED 100\%; ON HOLD <br> Comments: This template has 3 orbits with the different FP-POS spaning all the orbits in order to optimize the exposure time <br> On Hold Comments: ToO |  |  |  | Mon Mar 15 21:00:51 GMT 2021 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 或 | (3orbits COS-FUV G140L template (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (3orbits COS-FUV G140L template (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN |  |  |  |  |  |
|  | \# Name Criteria |  | Description |  |  |  |
|  | (1) BHXRB-CANDIDATE X-Ray Transient <br> Comments: This is a dummy test |  | ACCRETION DISK <br> EJECTA <br> WIND <br> X-RAY NOVAE <br> X-RAY TRANSIENT |  |  |  |
|  | \#Label <br> (ETC Run) Target $\quad$ Config,Mode,Aperture | Spectral Els. | Opt. Params. Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|  |  | MIRRORA |  |  | 60 Secs ( 60 Secs) <br> $[==>]$ | [1] |
|  | 2 SCI <br> (COS.sp. 141 <br> 6844) (1) BATERB-CANDI COS/FUV, TIME-TAG, PSA <br>    | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME }=10 \\ & 00 ; \\ & \text { FP-POS }=1 \\ & \hline \end{aligned}$ |  | 2000 Secs (2086 Secs) | [1] |
|  | 3 SCI <br> (COS.sp. 141 <br> 6844) (1) BHXXRB-CANDI COS/FUV, TIME-TAG, PSA <br> DATE | $\begin{aligned} & \hline \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | BUFFER-TIME $=10$ 00; <br> FP-POS=2 |  | 2500 Secs (2466 Secs) <br> [=> 2466.0 Secs ] | [2] |
|  | 4 SCI <br> (COS.sp. 141 <br> 6844) (1) BHXRB-CANDI COS/FUV, TIME-TAG, PSA <br> DATE   | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME=13 } \\ & 00 ; \\ & \text { FP-POS=3 } \\ & \hline \end{aligned}$ |  | 1400 Secs (1310 Secs) <br> [=>1310.0 Secs $]$ | [3] |
|  | 5 SCI <br> (COS.sp. 141 (1) BATE <br>  6844 DARB-CANDI COS/FUV, TIME-TAG, PSA  | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME=15 } \\ & 00 ; \\ & \text { FP-POS=4 } \end{aligned}$ |  | 1051 Secs (961 Secs) | [3] |

Proposal 16489-3orbits COS-FUV G140L template (01) - Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in

## Orbit 1

Server Version: 20200619


Orbit 2
Server Version: 20200619

## GS Reacq

Orbit Structure


Occultation
** ORBITAL VISIBILITY OVERRUN $=4$

Orbit 3
Server Version: 20200619


| $\frac{\pi}{5}$ | Proposal 16489, 3orbits COS-FUV G140L template (02), implementation <br> Diagnostic Status: Warning <br> Scientific Instruments: COS/FUV, COS/NUV <br> Special Requirements: SCHED 100\%; ON HOLD <br> Comments: This template has 3 orbits with the different FP-POS spaning all the orbits in order to optimize the exposure time <br> On Hold Comments: ToO |  |  |  | Mon Mar 15 21:00:51 GMT 2021 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 或 | (3orbits COS-FUV G140L template (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (3orbits COS-FUV G140L template (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN |  |  |  |  |  |
|  | \# Name Criteria |  | Description |  |  |  |
|  | (1) BHXRB-CANDIDATE X-Ray Transient <br> Comments: This is a dummy test |  | ACCRETION DISK <br> EJECTA <br> WIND <br> X-RAY NOVAE <br> X-RAY TRANSIENT |  |  |  |
|  | \#Label <br> (ETC Run) Target $\quad$ Config,Mode,Aperture | Spectral Els. | Opt. Params. Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|  |  | MIRRORA |  |  | 60 Secs ( 60 Secs) <br> $[==>]$ | [1] |
|  | 2 SCI <br> (COS.sp. 141 <br> 6844) (1) BATERB-CANDI COS/FUV, TIME-TAG, PSA <br>    | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME }=10 \\ & 00 ; \\ & \text { FP-POS }=1 \\ & \hline \end{aligned}$ |  | 2000 Secs (2086 Secs) | [1] |
|  | 3 SCI <br> (COS.sp. 141 <br> 6844) (1) BHXXRB-CANDI COS/FUV, TIME-TAG, PSA <br> DATE | $\begin{aligned} & \hline \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | BUFFER-TIME $=10$ 00; <br> FP-POS=2 |  | 2500 Secs (2466 Secs) <br> [=> 2466.0 Secs ] | [2] |
|  | 4 SCI <br> (COS.sp. 141 <br> 6844) (1) BHXRB-CANDI COS/FUV, TIME-TAG, PSA <br> DATE   | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME=13 } \\ & 00 ; \\ & \text { FP-POS=3 } \\ & \hline \end{aligned}$ |  | 1400 Secs (1310 Secs) <br> [=>1310.0 Secs $]$ | [3] |
|  | 5 SCI <br> (COS.sp. 141 (1) BATE <br>  6844 DARB-CANDI COS/FUV, TIME-TAG, PSA  | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME=15 } \\ & 00 ; \\ & \text { FP-POS=4 } \end{aligned}$ |  | 1051 Secs (961 Secs) | [3] |

Proposal 16489-3orbits COS-FUV G140L template (02) - Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in .
Orbit 1


Orbit 2
Server Version: 20200619


Orbit 3
Server Version: 20200619


| $\frac{\pi}{5}$ | Proposal 16489, 3orbits COS-FUV G140L template (03), implementation <br> Diagnostic Status: Warning <br> Scientific Instruments: COS/FUV, COS/NUV <br> Special Requirements: SCHED 100\%; ON HOLD <br> Comments: This template has 3 orbits with the different FP-POS spaning all the orbits in order to optimize the exposure time <br> On Hold Comments: ToO |  |  |  | Mon Mar 15 21:00:51 GMT 2021 |  |
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| 或 | (3orbits COS-FUV G140L template (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (3orbits COS-FUV G140L template (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN |  |  |  |  |  |
|  | \# Name Criteria |  | Description |  |  |  |
|  | (1) BHXRB-CANDIDATE X-Ray Transient <br> Comments: This is a dummy test |  | ACCRETION DISK <br> EJECTA <br> WIND <br> X-RAY NOVAE <br> X-RAY TRANSIENT |  |  |  |
|  | \#Label <br> (ETC Run) Target $\quad$ Config,Mode,Aperture | Spectral Els. | Opt. Params. Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|  |  | MIRRORA |  |  | 60 Secs ( 60 Secs) <br> $[==>]$ | [1] |
|  | 2 SCI <br> (COS.sp. 141 <br> 6844) (1) BATERB-CANDI COS/FUV, TIME-TAG, PSA <br>    | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME }=10 \\ & 00 ; \\ & \text { FP-POS }=1 \\ & \hline \end{aligned}$ |  | 2000 Secs (2086 Secs) | [1] |
|  | 3 SCI <br> (COS.sp. 141 <br> 6844) (1) BHXXRB-CANDI COS/FUV, TIME-TAG, PSA <br> DATE | $\begin{aligned} & \hline \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | BUFFER-TIME $=10$ 00; <br> FP-POS=2 |  | 2500 Secs (2466 Secs) <br> [=> 2466.0 Secs ] | [2] |
|  | 4 SCI <br> (COS.sp. 141 <br> 6844) (1) BHXRB-CANDI COS/FUV, TIME-TAG, PSA <br> DATE   | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME=13 } \\ & 00 ; \\ & \text { FP-POS=3 } \\ & \hline \end{aligned}$ |  | 1400 Secs (1310 Secs) <br> [=>1310.0 Secs $]$ | [3] |
|  | 5 SCI <br> (COS.sp. 141 (1) BATE <br>  6844 DARB-CANDI COS/FUV, TIME-TAG, PSA  | $\begin{aligned} & \text { G140L } \\ & 1105 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \text { BUFFER-TIME=15 } \\ & 00 ; \\ & \text { FP-POS=4 } \end{aligned}$ |  | 1051 Secs (961 Secs) | [3] |

Proposal 16489-3orbits COS-FUV G140L template (03) - Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in .

## Orbit 1

Server Version: 20200619


Orbit 2
Server Version: 20200619

## GS Reacq

Orbit Structure


Occultation
** ORBITAL VISIBILITY OVERRUN $=4$

Orbit 3
Server Version: 20200619


Proposal 16489-3orbits COS-FUV G140L template (04) - Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in


Proposal 16489-3orbits COS-FUV G140L template (04) - Outflow Legacy Accretion Survey: unveiling the wind driving mechanism in


