4U 1916-053

Observation plan

4U 1916-053 will be observed for 50 ks, from which we expect we expect in total 40 ks of persistent emission and ~10 ks of dipping emission. We ask the observation to be split in two parts taken a few days aside to maximize the chances to obtain deep dips in at least one of the exposures. This is driven by the fact that XB 1916−053 has been occasionally observed at periods when the dips were very narrow and shallow, which are worse for the proposed studies, compared to periods of wide, deep dips.

For this target, we request the open filter for Resolve (expected count rates are 16.7 s^{-1} for 4U 1916-053 in persistent emission). For Xtend we request the 1/8th Full Window Mode for this target (expected count rates are 15.8 s^{-1} in persistent emission for 4U 1916−053).

Immediate objectives

[1] Measure the column density, ionization and velocity of the plasma or plasmas present during persistent emission to determine if a wind is present (and if so measure its mass outflow rate) or rather a static atmosphere or hot corona.

[2] Measure the column density, ionization and velocity of the plasma or plasmas present during dipping emission in a flux- and phase-resolved manner to constrain the geometry of the plasma or plasmas responsible for the obscuration during dipping. In particular, attempt to determine the precise location of the lines (e.g. low ionization lines could be on the stream of cold material towards the disc, at the zone of impact with the disc or even further inside the disc) to understand the relation between low and high ionization plasmas, e.g. whether they might result from a thermal instability.

[3] Attempt to detect emission lines (e.g. He-like triplets from O VII or Mg XI) during the deepest dipping episodes or absorption lines from meta-stable levels (e.g. Fe XXII) that can help constraining the density of the plasmas.

[4] For 4U 1916-053, measure the phase-dependence of absorption lines width and shift to locate the region in the disc where the plasma originates and confirm the presence of a gravitationally shifted atmosphere.

[5] Study the dependence of the presence of dips or of the detected plasmas as a function of changes in the continuum (luminosity and hardness) e.g. to constrain if radiation pressure may help launching a wind and to further understand potential shielding in the disc.

If X-ray bursts occur during the observations:

[6] Study the dependence of the presence of dips or of the detected plasmas following the X-ray burst to further constrain the effects of illumination on the existing plasmas (and the recombination timescales), the capability to launch a wind via radiation pressure, and the location of the plasmas.

[7] If the bursts show photospheric radius expansion, search for lines within the bursts that can be attributed to the spread of burst products in the corona or on the surface of the accretion disc. This could be the first detection of such products.