Jupiter

Observation plan

Jupiter is a moving target and the number of pointings to follow its orbital motion in the sky depends on when we observe it. Below is a summary of the observation plan.

1. Observable time and the number of pointings :

Observable time in 2023 and 2024	Total apparent angular rate in the sky [arcsec/min]	The number of pointings*	Distance to the target [AU]
2023 Jan 1 – Jan 24	0.3-0.4	6-8	5.0-5.4
2023 Jul 2 - Sept 8	0.5-0.04	10-1	5.3-4.4
2023 Dec 28 – Dec 31	0.03-0.02	1	4.4-4.5
2024 Jan 1- Mar 1	0.02-0.4	1-8	4.5-5.4
2024 Aug 8 – Oct 15	0.4-0.06	8-2	5.4

* Assuming the exposure time of 100 ks and observation efficiency due to Earth occultation of 50 %. For example, when the angular rate of the target is 0.3 arcsec/min, the total angular distance of the target is 0.3 arcsec/min * 100 ks / 0.5 (efficiency) = 16 arcmin. Then, the required number of pointings becomes 16/2.9 = 5.7 where the FOV of the Resolve is 2.9 arcmin. So we need 6 pointings.

2. Exposure time : 100 ks
3. Filter option for the Resolve FW : Open
   Considering the filters in the dewar and the thermal filter of the telescope, optical loading effect will be negligible.
4. Coordinate observation : As an option, if the PV observation is approved (Jupiter is Pri.C) and the observation schedule is roughly fixed, we would like to coordinate observations with JUNO (NASA's Jupiter exploration, in-situ particle measurement), Chandra (X, high spatial resolution), XMM (X, high photon statistics), Hisaki (EUV, Io Plasma Torus), Hubble (IR, aurora) and ground observation sites.

Immediate objectives

[1] Measure the position and depth of the scattering features from solid interstellar Oxygen.

[2] Compare Fe L shell XSFS against a library of lab-measured mineralogical templates to evaluate the composition of Iron bearing interstellar dust.

[3] Establish the analysis method for bright point sources. Observe Fe K emission/absorption lines to understand the plasma condition and constrain Doppler and gravitational shifts of a neutron star low-mass X-ray binary.