

# Astro-H SXS contamination monitoring and mitigation

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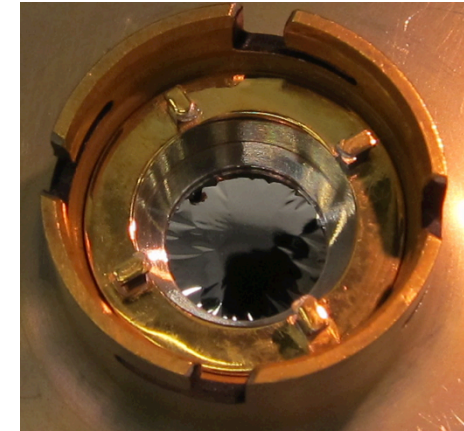
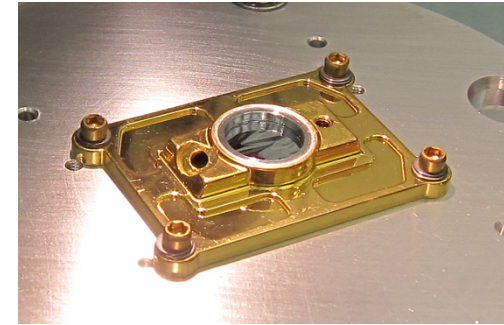
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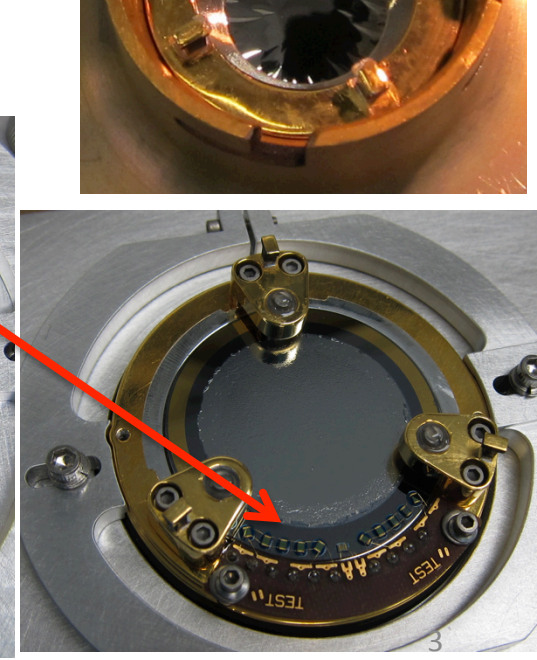
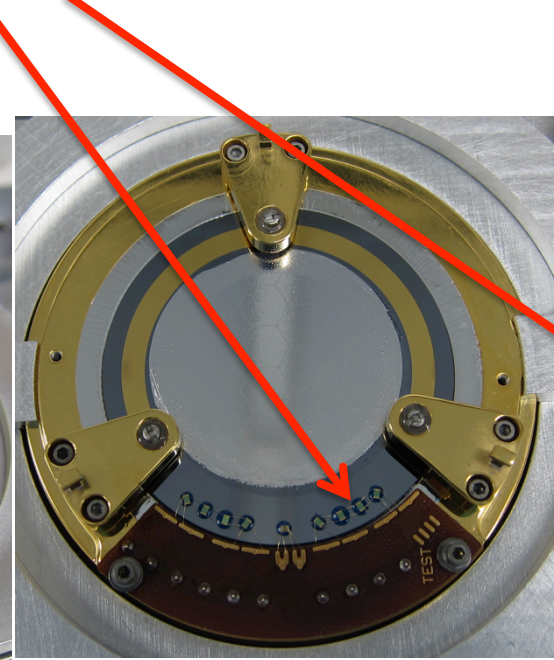
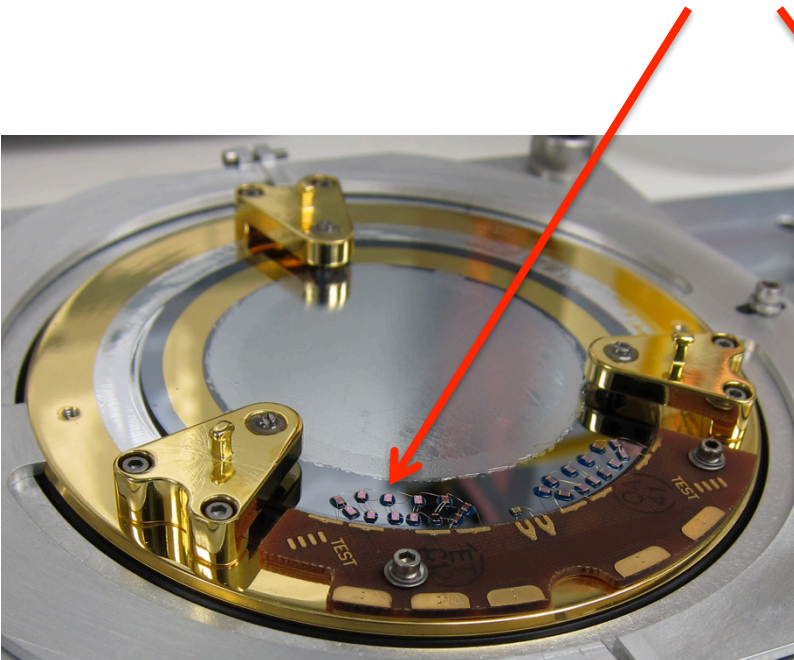
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# Optical blocking filters

Filter	Aluminum Layer	Polyimide Layer
CTS	50 nm	75 nm
DA	50 nm	75 nm
IVCS	100 nm	100 nm
OVCS	100 nm	100 nm
DMS	100 nm	100 nm



Heaters and thermometers allow  
“defrosting” of filters, which are mounted on  
thermally conductive Si mesh supports



# Aperture assembly structure

Baseline plan is to operate DMS heater continuously to prevent sticking of contaminants

Dewar Main Shell (**DMS**)

Temp: 290K

Outer Vapor Cooled Shield (**OVCS**)

Temp: 155K

**(80K During Helium Servicing)**

\* Middle Vapor Cooled Shield (**MVCS**)

Temp: 113K

Inner Vapor Cooled Shield (**IVCS**)

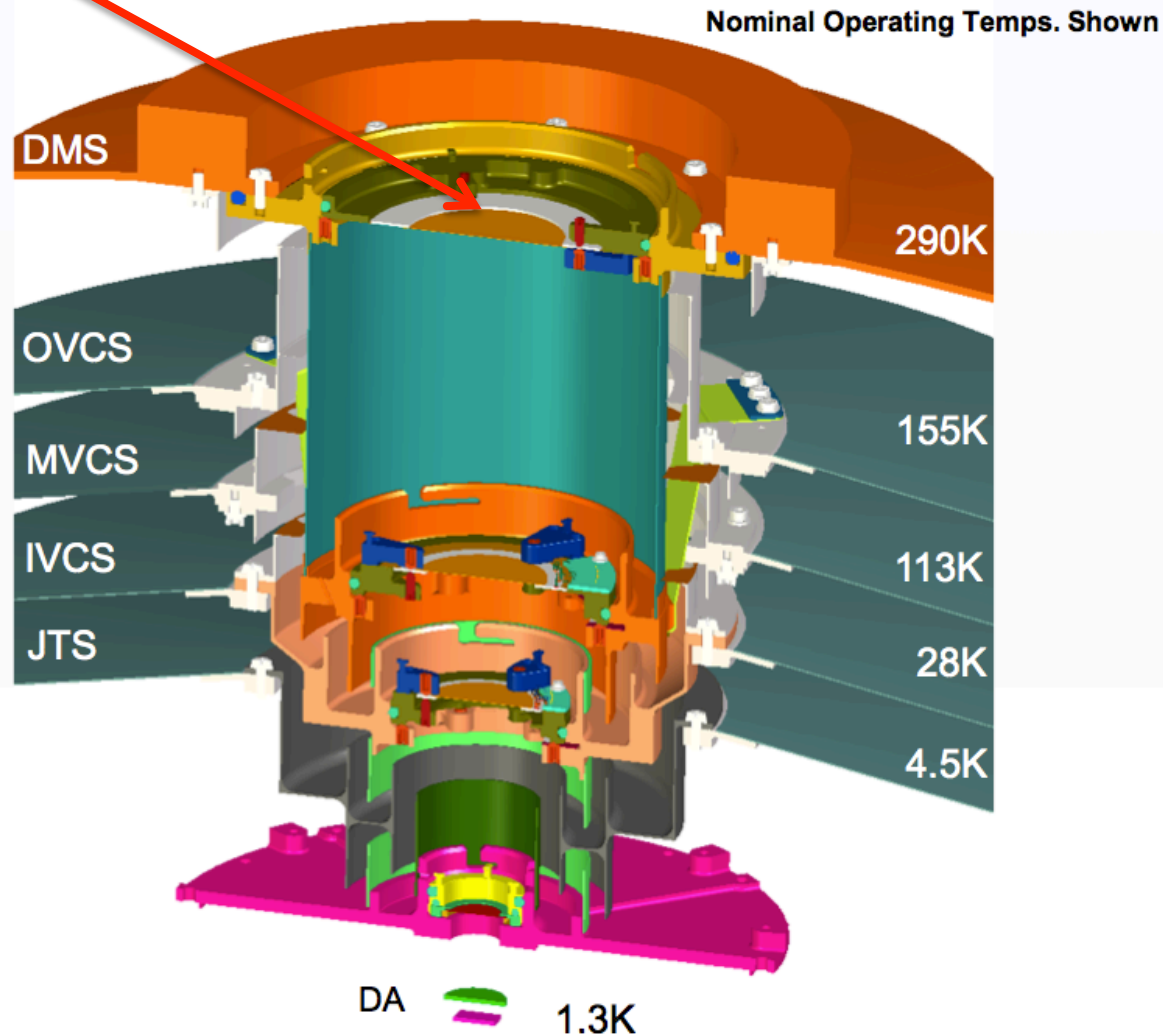
A Temp: 28K

Joule-Thomson Shield (**JTS**)

Temp 4.5K

Detector Assembly (**DA**)

Temp: 1.3 K



- Most likely contaminants are hydrocarbons from spacecraft
- Best targets for monitoring would have stable flux of C, N, O K shell lines, fill SXS field of view, provide  $\sim$  few counts/s/pixel – Galactic SNR?

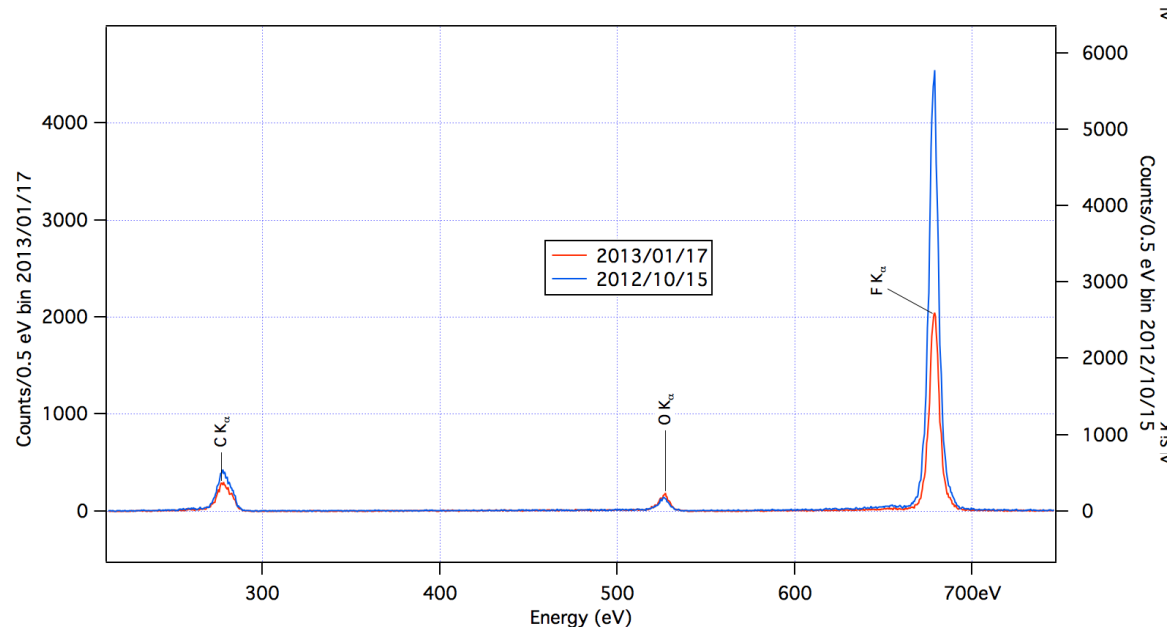


# Contamination Monitoring Example (during GSFC DA testing)



GSFC Modulated X-ray Source  
attached to lab dewar

- we modified MXS provided by GSFC Gendreau lab by wrapping Cr target in teflon and Al to obtain emission lines that sample the oxygen edge
- C K $\alpha$  – 0.28 keV, O K $\alpha$  – 0.53 keV
- F K $\alpha$  – 0.68 keV, Al K $\alpha$  – 1.49 keV [strongest lines]
- obtained spectra near the beginning and end of calibration



- results indicate 800 nm of ice built up on blocking filters between Oct 15 2012 and Jan 17 2013 (3 months) in non-optimized laboratory dewar.
- source and electronics are portable – this method can be used to check for ice during FM testing. *We do not expect any icing* in the flight dewar, and are assessing the minimum change in thickness we can measure using reasonable exposure times.