



NEXUS / SDO / ILWS

- SDO Science goals: How does solar variability directly affect life on Earth?
- SDO areas of interest:
 - Solar Cycle
 - Active region development
 - Flares and CMEs
 - Total and EUV spectral irradiance



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- SDO Payload (highest priority):
 - Doppler imager
 - Magnetograph
 - Coronal imagers
 - EUV spectral irradiance monitor
- (Lower priority):
 - EUV/UV spectrometer
 - Photometric imager
 - Total irradiance
- SDO parameters
 - Geosynchronous orbit, High data rate, 5 year mission, launch 2007



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- SDO spectrograph capabilities
 - Rapid cadence (10s)
 - Large FOV
 - Extended temperature coverage: 20,000 K to 4 MK
 - Doppler measurements of 1-5 km/s
 - 1.2 arc-sec spatial resolution



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- Basic components of NEXUS
 - 2 element optical design
 - Off-axis parabolic mirror telescope f/11
 - Toroidal variable-line-space grating spectrograph with a magnification of about 5.5
 - B4C / Iridium optical coatings
 - Slit (0.5 arcsec) / Slot (1 arcmin)
 - ICCD detectors
 - Wavelength ranges (all first order): 457-525, 566-631, 743-800 Å

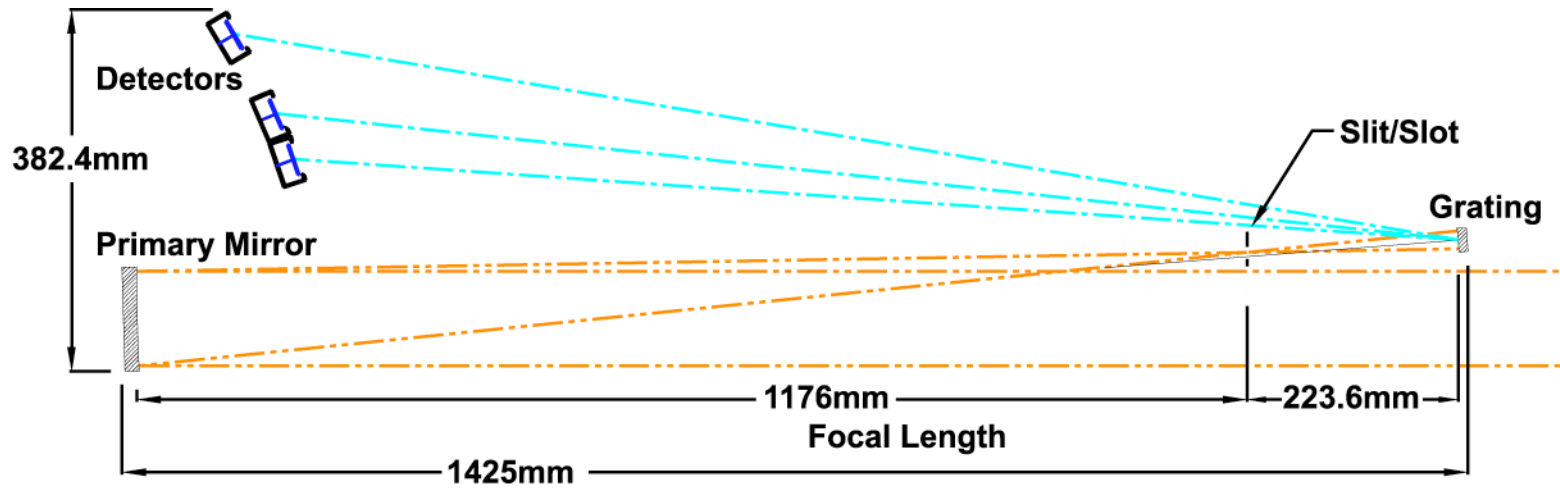


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- NEXUS S/C resources
 - Envelope: 150 x 22 x 50 cm (optics box)
 - 17 x 10 x 15 cm (electronics box)
 - 15 x 15 x 10 cm (electronics box)
 - Mass: 38 kg
 - Power: 44 W w/o heaters (12 W)
 - Data rate: 13.5 Mbps (ave.)
 - 23 Mbps (peak)



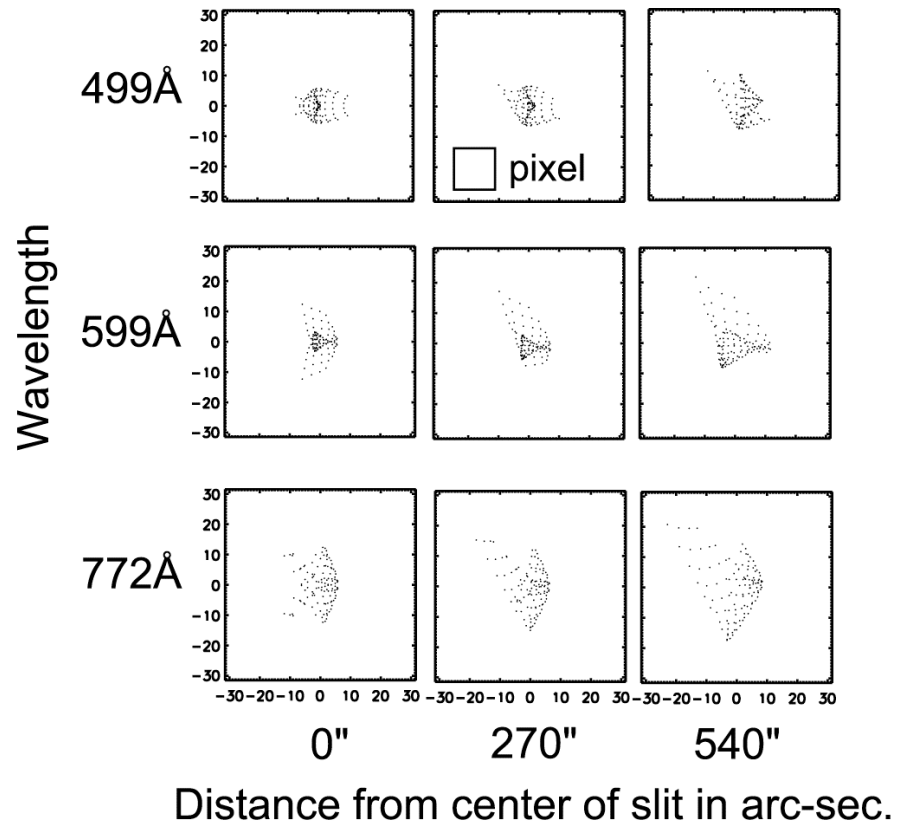
Optical Layout



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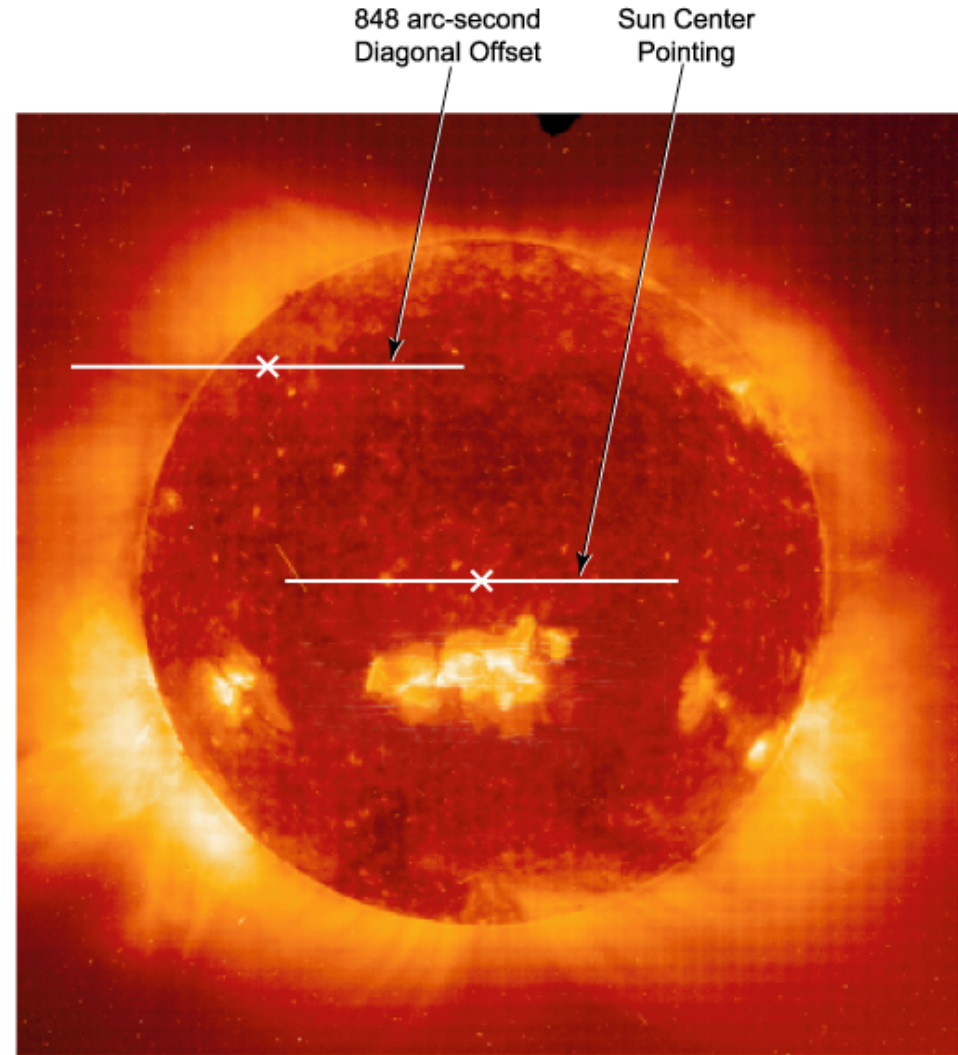
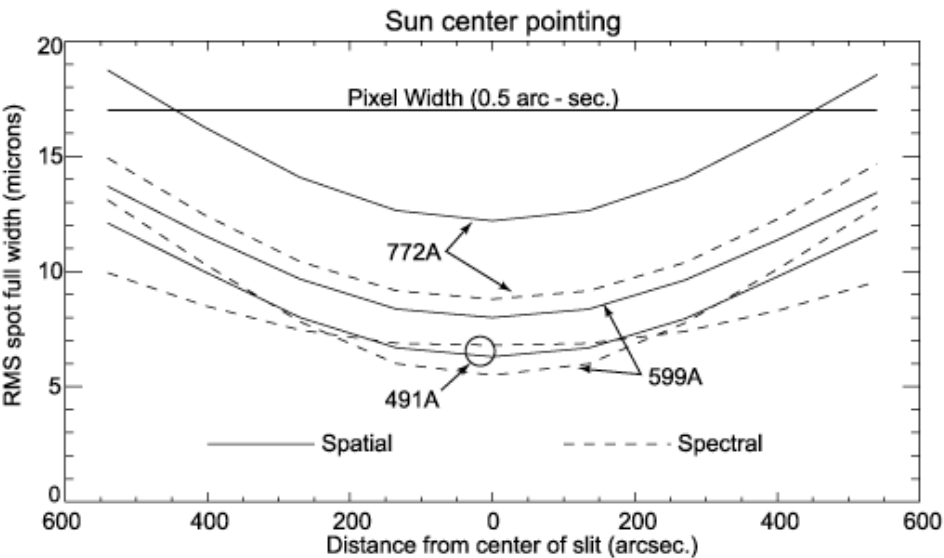
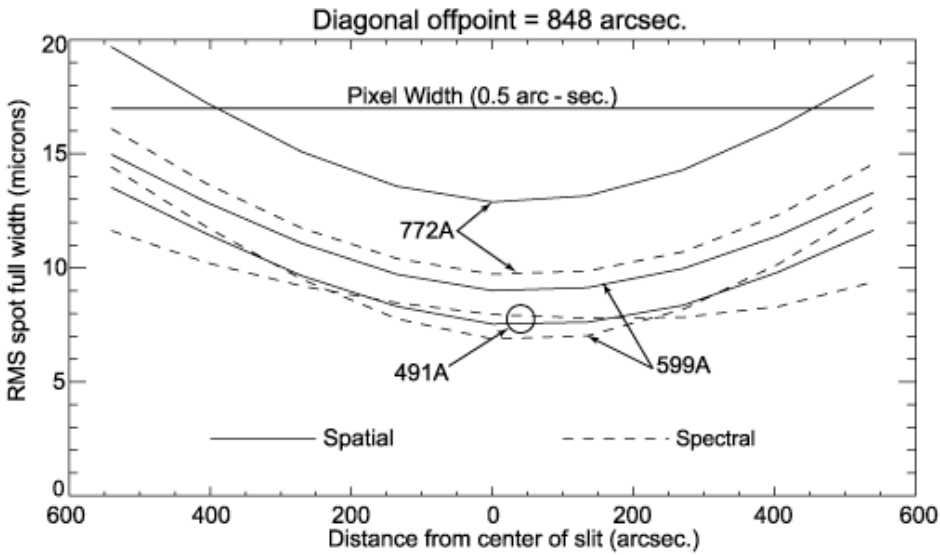


Spectrometer Spot Diagrams



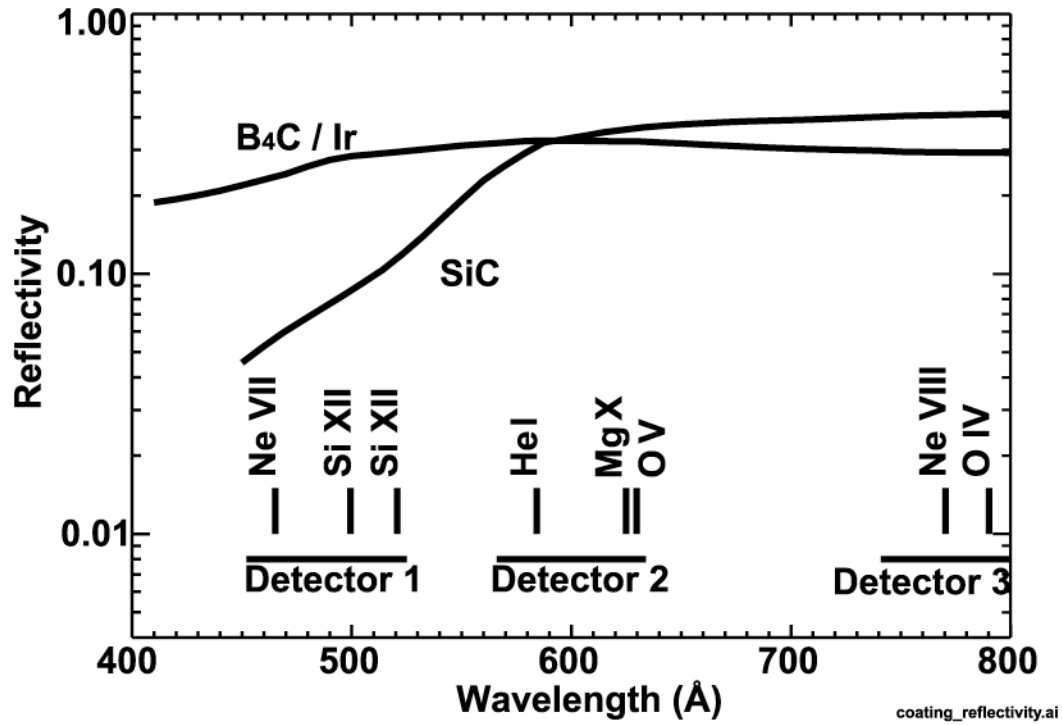


Combined Telescope/Spectrometer Optical Performance





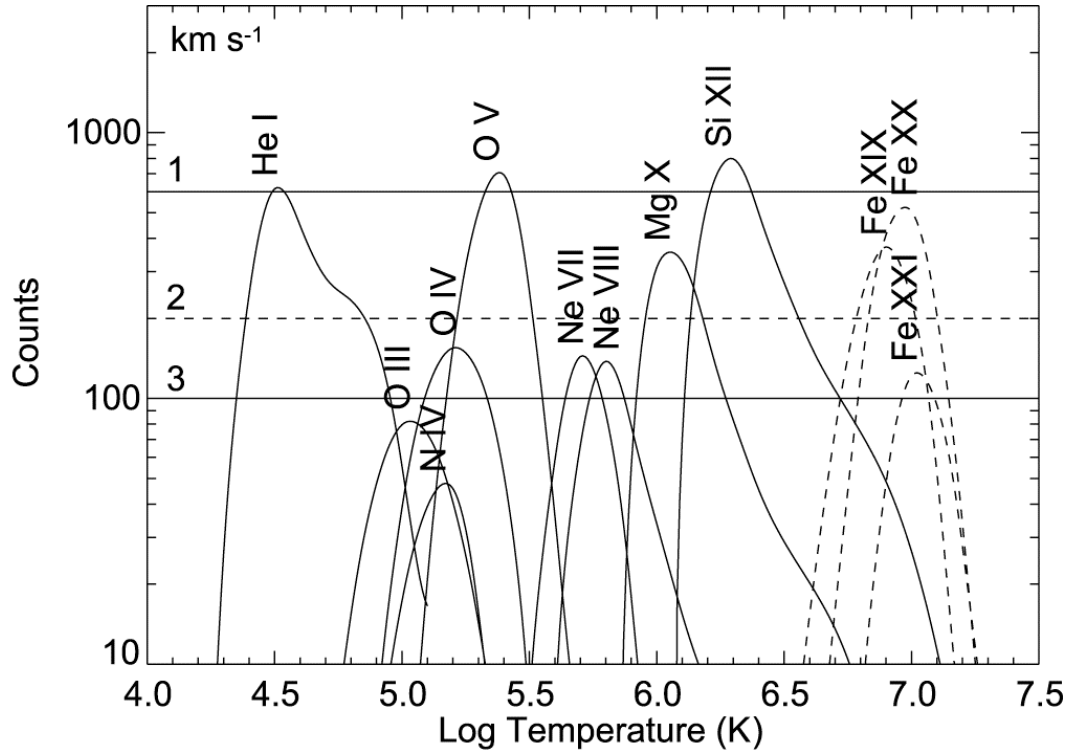
Coating Reflectivity



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Contribution Functions for Strongest NEXUS Lines





NEXUS Strongest Spectral Lines

Ion	λ (Å)	log T (MK)	Detected Photons in 0.5" Slit per Second		
			Quiet Sun	Active Region	M1 Flare
Ne VII	465.220	5.71	13.3	143.7	1317.
Si XII	499.407	6.28	17.3	796.6	24604.
Si XII	520.666	6.28	8.9	409.8	12699.
Fe XX	567.864	6.97	0.0	0.2	5053.
Al XI	568.122	6.16	1.6	54.5	520.
He I	584.334	4.51	71.4	614.0	78793.
Fe XXI	585.790	7.02	0.0	0.0	1217.
Fe XIX	592.236	6.90	0.0	0.9	3715.
O III	599.601	5.03	13.1	79.6	13356.
2x He II	607.560	4.92	3.6	23.4	12608.
Mg X	609.794	6.05	24.7	668.2	6696.
O IV	609.832	5.21	9.1	63.8	7344.
Mg X	624.943	6.05	12.1	327.2	3252.
O V	629.730	5.38	86.3	693.0	46338.
Ne VIII	770.410	5.80	8.1	137.9	809.
Ne VIII	780.325	5.80	4.4	74.6	438.
O IV	787.713	5.21	10.7	75.7	9257.
O IV	790.203	5.21	19.9	139.8	17076.