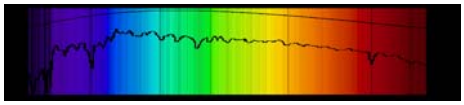
Maximum-Resolution Solar Spectrometer (QMAX™)



The Questar Corporation of New Hope, Pennsylvania, is pleased to announce the world's first, Maximum-Resolution Solar Spectrometer (**QMAX**™) capable of fitting comfortably in the palm of a hand. The Questar **QMAX**™ attaches easily to any telescope that is compatible, according to its manufacturer, with solar observation and that has a 1.25" drawtube. The Questar Maximum-Resolution Solar Spectrometer blocks ultraviolet and infrared radiation while allowing the sun's visible light, the visible solar spectrum, to be viewed in true and gorgeous color.

- Variability
  - Prominence Emission, Radial Height & Structure — Hα, Hβ, Hγ, D_3
  - Line reversal over flares — emission breaking out abruptly in absorption
  - Doppler shifts over flares — velocity-shifted emission to red / blue
  - Monster-sunspot Zeeman splitting — Fe I
  - Sunspot line broadening
  - Helium emission from chromosphere, tangential slit, coronal hole indicator
  - Telluric lines: dramatic intensification at Sunset and Sunrise — H_2O
- Resolution <0.17Angstrom Units (Å) = 0.017nm
  - Heisenberg Uncertainty Principle — only visible effect of it, Mg Lines
  - Molecular bands — super-close methyne (CH) energy levels; G-band
  - Hα so broad that "it looks like a tree trunk"
  - Sodium D-Lines so far apart telluric lines between them look like forest
  - Line shape — sharp vs. broad — line wings
  - Huge H & K lines

Intimate, beautiful, greatly enlarged views of atomic and molecular lines throughout the solar spectrum at a level of breathtaking detail never before available from such an extremely compact, commercial Spectrometer are made possible by a uniquely Questar insight into the nature of image formation by high-precision optics. US and foreign patents pending.

Orders are currently being taken for June 2002 delivery.
http://www.QuestarCorporation.com
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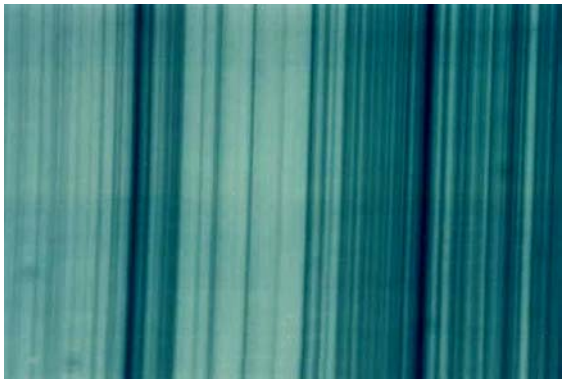
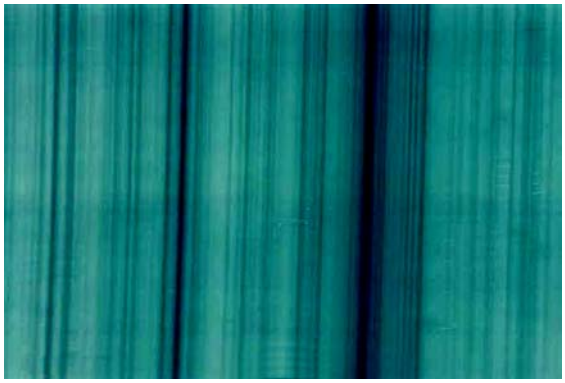
Specifications

Maximum Resolution:	0.17 Å (Angstrom units), or 0.017 nm (nanometers); see note 1 below
Wavelength range:	3850 to 6900 Å, or 385 to 690 nm
Ocular:	QUESTAR® Brandon 8mm
Width of Field:	68 Å, or 6.8 nm at 5500 Å
Magnification of Spectrum:	95 x relative to the image of the spectrum formed by the spectrometer's imaging mirror; see note 2 below
Equivalent Magnification of Sun:	521 x relative to the sun seen in the sky; for example, a sunspot's angular, North-South extent appears increased 521 times; see note 3 below
Wavelength scale:	digital readout in 0.2 nanometer (2Å) increments
Dispersion:	11.6 Å/mm, or 1.16 nm/mm, in the focal plane of QUESTAR's 8mm Brandon ocular, at 5500 Å.
Telescope Pre-filter:	infrared absorption
Post-dispersion Filter:	ultraviolet absorption



G-Band of CH (methyne)molecule at 4310Å, fully resolved. Color through eyepiece is rich royal blue.

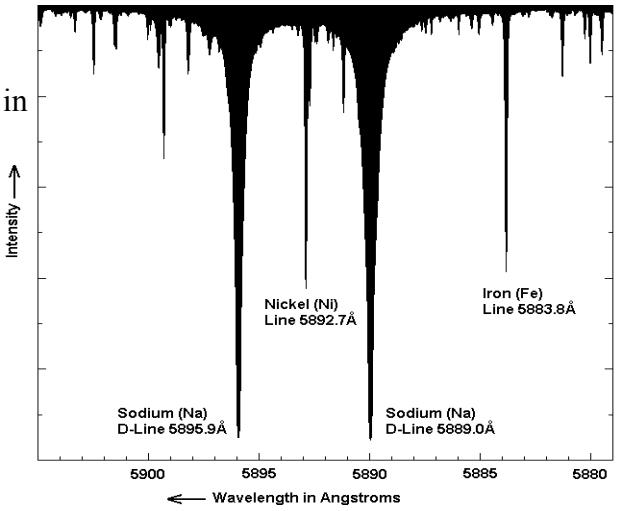


Hγ at 4340Å with CH band in wing 31 Angstroms wide. 150 sec.

Film-photo spectrograms taken through 100mm lens at the QMAX™ eyepiece
Developed and printed at local 1-hr Photo shop. JPEG scans of prints.

Contrast amplification ratio for observing at the far-blue, and far-red, ends of the spectrum:	10x
Resolution loss at far-blue and far-red ends:	none; full resolution is maintained
East-west resolution on solar disk:	limited only by seeing; finer than the characteristic, angular width of solar granulation
North-south resolution on the solar disk:	approximately 5.3 minutes of arc in **QUESTAR®** Brandon 8mm ocular
Weight:	2 pounds 7 ounces
Size:	can be held in palm of hand

Sodium D Lines near Sunrise with several telluric, H_2O lines 200 ASA 32sec.



Specification Notes:

1. 10 Angstrom units (10Å) = 1 nanometer (1 nm) = 10^{-9} meters. **QUESTAR's** Maximum-Resolution Solar Spectrometer just resolves the two faint lines at 4991.072 Å (Titanium) and 4991.275 Å (Iron), separated by 0.203 Å.

2. The optical relay preceding the ocular has a nominal 1:3 ratio. Thus, the ocular receives an image of the spectrum 3 times larger than the image formed by the spectrometer's imaging mirror. An 8mm ocular used as a magnifier results in a magnification of about 31.75, assuming 10" to be the closest a normal eye can approach an object. 3 x 31.75 = 95.25.

3. The focal length of a 3.5" **QUESTAR®** telescope focused on the spectrometer's entrance slit is approximately 1390mm. Since the spectrometer's collimating and imaging mirrors have the same focal length, no enlargement of the entrance slit occurs within the spectrometer. The tiny slice of the sun isolated by the entrance slit is delivered 1 to 1 into the image-plane of the spectrum, for a given wavelength. The 1:3 optical relay preceding the ocular then enlarges this tiny slice three times, including any portion of a sunspot that happens to lie focused on the entrance slit, exactly as if the focal length of a 3.5" **QUESTAR®** were 4170mm. An 8mm eyepiece used with a 4170mm focal length objective yields a power of 521.25 = 4170÷8