

The Wide-band High-resolution Imaging Spectro-Polarimetric Explorer (WHISPER) for the 1.6-meter Goode Solar Telescope

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Adaptive optics and image restoration have enabled solar spectropolarimetry at an angular resolution on a par with imaging, but photon noise limits the diagnostic power of such high-resolution data. This is a problem of increasing severity for larger telescopes because the solar evolution time scale decreases as aperture increases, further limiting the photon collection time. WHISPER, a next-generation facility instrument under development for the GST at the Big Bear Solar Observatory, addresses this by instead expanding in the wavelength dimension to collect more photons. The instrument is specifically designed for many-line inversion schemes, which simultaneously invert dozens or even hundreds of spectral lines, leading to more precise and accurate inference of atmospheric parameters. WHISPER's primary wavelength passband spans 10 nm, from 516 to 526 nm, which includes the chromospheric MgI triplet at 517 nm, the well known FeI line pairs near 525 nm, as well as a plethora of additional spectral lines, many of which with a significant magnetic sensitivity. While the fundamental noise problem and the benefits of many-line inversion are covered elsewhere in this workshop, this contribution focuses on the specifics of the instrument which is expected to see first light in 2027.