



DKIST First Light Instrument Capabilities

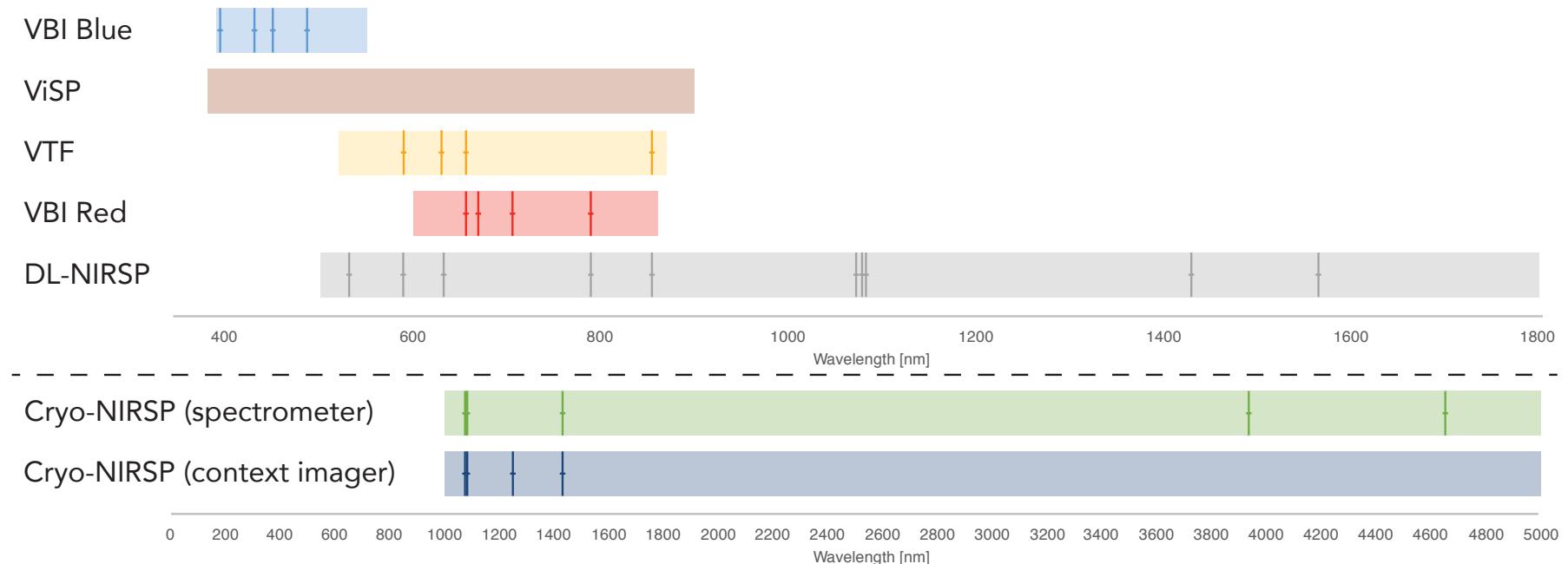


| | Instrument Type | Spectral Range | Spectral Resolution | Spatial Sampling | Maximum Instantaneous Field of View | Maximum Sampled Field of View | Peak Cadence | Analogous Instruments |
|---|--|--|------------------------------------|--|--|--|---|---|
| Visible Broadband Imager VBI (Blue) | High Cadence, High Resolution Imager | 390–550nm (sequential filter sequencing) | N/A | 0.011" | 45" x 45" | 2' x 2' (sequential field sampling) | 3.2 sec (reconstructed) 0.03 sec (raw images) | ROSA, Hinode/BFI <i>High cadence, high spatial resolution</i> |
| Visible Spectropolarimeter ViSP | Scanning Slit Spectropolarimeter | 380–900nm (3 spectral windows at a time) | >180,000 | 0.0295" (arm 1) 0.0236" (arm 2) 0.0195" (arm 3) [sampling along slit] | Width \times Length 0.028" 0.041" 0.053" 0.106" 0.214" \times 75" (arm 1) 60" (arm 2) 50" (arm 3) | Slit length x 2' | 0.5 – 10 sec per slit position (polarimetry) 0.02 – 0.2 sec per slit position (intensity-only) | SPINOR, Hinode/SP, IRIS, GRIS <i>Scanning spectrograph, high spectral fidelity</i> |
| Visible Tunable Filter VTF | Fabry Perot Imaging Spectropolarimeter | 520–870nm (sequential scans through multiple spectral lines) | FWHM 6–8 pm | 0.014" | 60" round | 60" round | Typical scan times per spectral line: 0.5 – 2 s (intensity only); 2 – 10 s (polarimetry) | IBIS, CRISP, GFPI <i>Imaging spectropolarimeter</i> |
| Visible Broadband Imager VBI (Red) | High Cadence, High Resolution Imager | 600–860nm (sequential filter sequencing) | N/A | 0.017" | 69" x 69" | 2' x 2' (sequential field sampling) | 3.2 sec (reconstructed) 0.03 sec (raw images) | ROSA, Hinode/BFI <i>High cadence, high spatial resolution</i> |
| Diffraction Limited Near Infrared Spectropolarimeter DL-NIRSP | Integral Field Unit Spectropolarimeter | 500–900nm 900–1350nm 1350–1800nm (1 filter band per channel) | 125,000 | 0.03" (high res) 0.077" (mid res) 0.464" (wide field) | 2.4" x 1.8" (high res) 6.16" x 4.62" (mid res.) 27.84" x 18.56" (wide) | 2' x 2' | Depends on resolution and total field of view. E.g. 6s for one tile, on-disk, high resolution, full polarimetry | SPIES, GRIS-IFU <i>True Imaging Spectropolarimeter: simultaneous 2D FOV and spectral information using fiber-fed IFU</i> |
| Cryogenic Near Infrared Spectropolarimeter Cryo- NIRSP | Scanning Slit Spectropolarimeter | 1000–5000nm (1 filter band at a time. About 70 s to switch filters) | 100,000 on-disk 30,000 off-limb | 0.12" [along slit] (no Adaptive Optics) | 2 slits 0.15" x 120" slit 0.5" x 240" slit | 4' x 3' (near limb) 5' round (off-limb) | Heavily depends on signal to noise. Maximum frame rate is 10 frames per second e.g. 1s per slit position near-limb/chromosphere | CYRA (BBSO) <i>Cryogenic, scanning spectrograph, novel diagnostics</i> |
| Cryo-NIRSP Context Imager | Imager | 1000–5000nm (1 filter band at a time, with fast switching time to support sequential observations during a single-band spectrograph scan.) | N/A | 0.052" (no Adaptive Optics) | 100" x 100" | 4' x 3' (near limb) 5' round (off-limb) | Heavily depends on signal to noise. Maximum frame rate is 10 frames per second e.g. 1s per slit position near-limb/chromosphere | CYRA (BBSO) <i>Cryogenic, scanning spectrograph, novel diagnostics</i> |

This table is meant to give an idea of the capabilities of the DKIST first light instrument suite. It cannot capture the large trade space that is provided by the flexibility of the instruments. For more, visit www.nso.edu/telescopes/dkist/instruments/



DKIST First Light Instrument Filters



| | VBI Blue | ViSP | VTF | VBI Red | DL-NIRSP | Cryo-NIRSP | Cryo Context |
|-----------|-----------|--|-----|-----------|-----------|------------|--------------|
| Ca II K | 393.327nm | Access to entire spectral range between 380-900 nm | | Na D | 589.6nm | Fe XIV | 530.3 nm |
| G-band | 430.52nm | | | Fe I | 630.25nm | Fe XIII | 1074.7nm |
| Continuum | 450.287nm | | | H-alpha | 656.282nm | Fe XIII | 1079.7nm |
| H-beta | 486.1nm | | | Continuum | 668.423nm | He I | 1083 nm |
| | | | | Ti O | 705.839nm | Si X | 1430nm |
| | | | | Fe XI | 789.186nm | Si IX | 1430nm |
| | | | | | | CO | 4651nm |
| | | | | | | | |

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