# HysplRI-TIR Calibration Approach

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# Calibration Overview

- Spectral Calibration
- Radiometric Calibration
- Spatial Calibration
- On-Orbit Calibration

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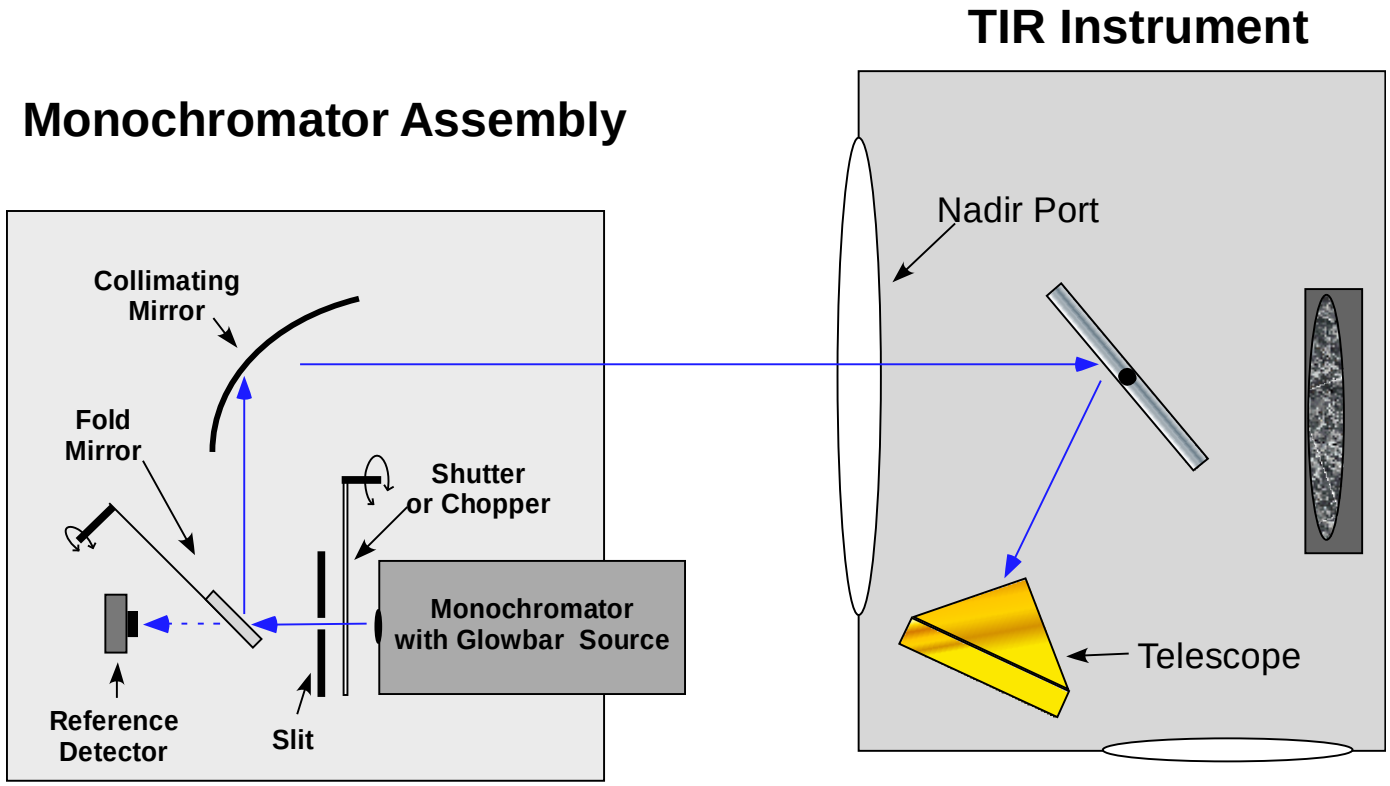
# Spectral Calibration with Monochromator




- Heritage (JPL) – PMIRR, TES, MCS, Diviner
- Straightforward approach with reliable results.
- Only a small number of pixels are measured at once. Very time intensive to measure all pixels over full spectral range.

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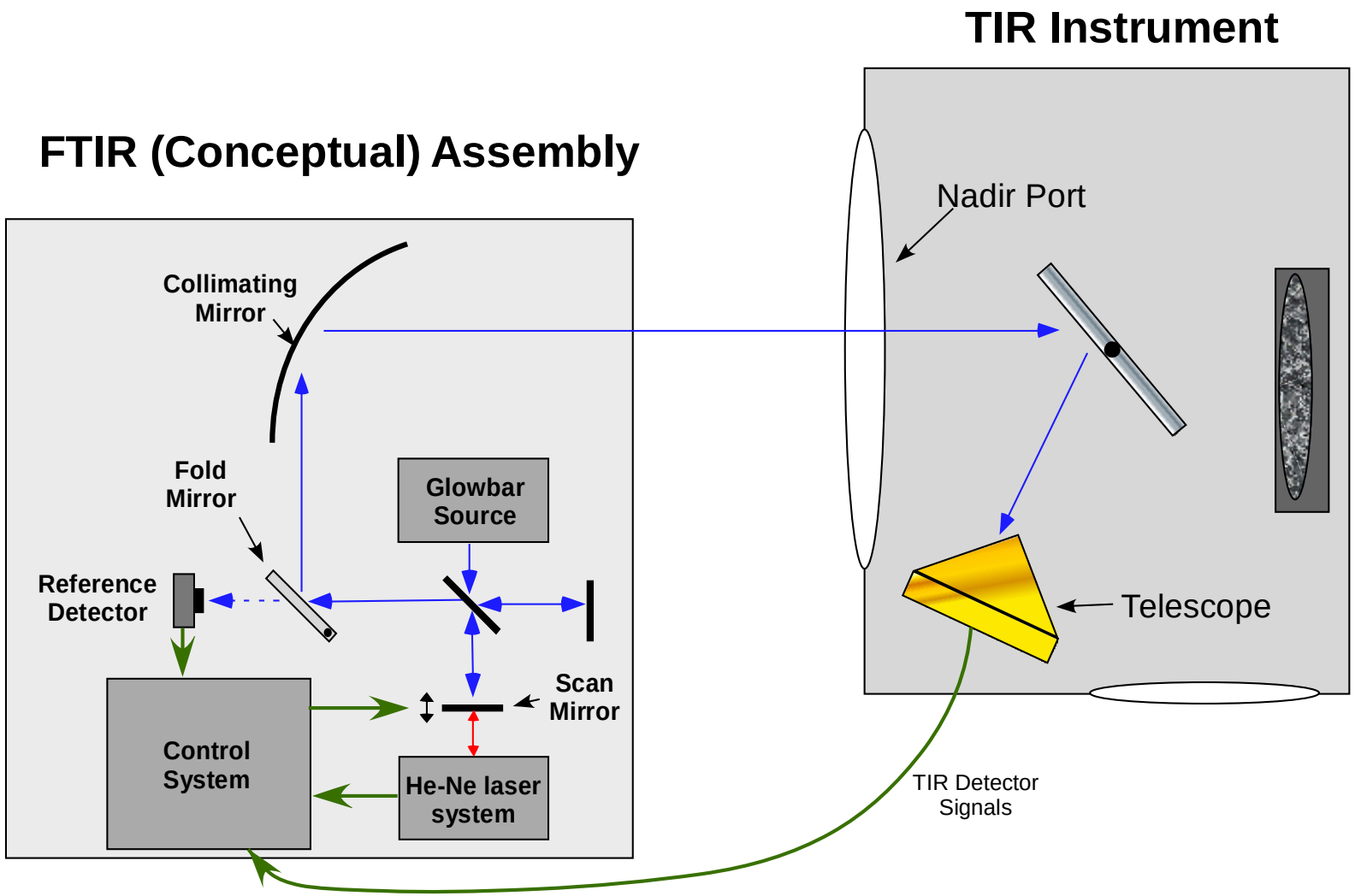
# Spectral Calibration with FTIR



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# FTIR Spectral Calibration

**Heritage:**

- AIRS
- OCO

**Advantages:**

- All pixels and wavelengths measured simultaneously
- Automatic spectral calibration to Helium Neon laser standard wavelength (632.8nm)

**Disadvantages:**

- Requires stepping of FTS to be synchronized with sampling of TIR detectors, or cumbersome post analysis.

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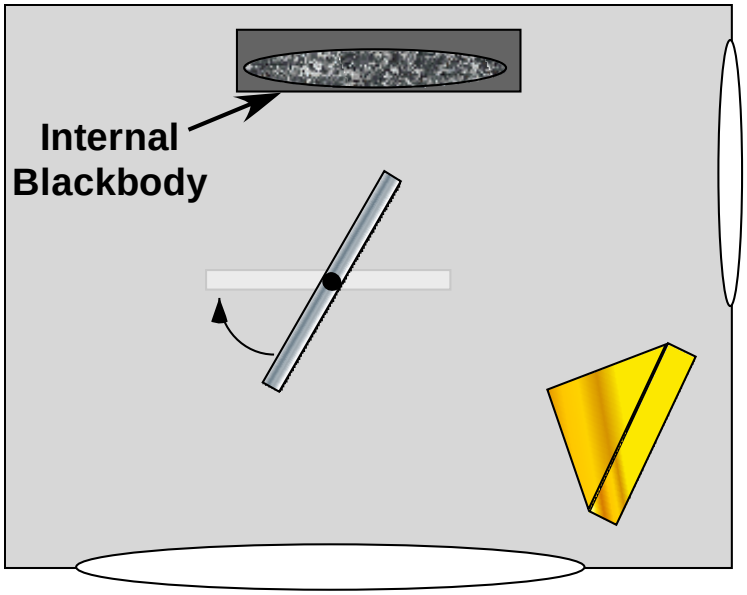
# Radiometric Calibration




**Cold Blackbody Source (LN2)**

**Variable Temperature Blackbody Source**

- Performed in vacuum to prevent condensation on cold blackbody surfaces.
- Scan mirror rotates to scan between internal blackbody, cold blackbody, and variable temperature blackbody.
- Variable temperature blackbody is stepped over entire scene temperature range.
- System nonlinearities can be determined using measured spectral response and blackbody response.
- NETD determined by temperature response and noise level.

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# Calibration of Blackbody Source

- Cavity temperature will be determined using NIST-traceable sensors.
- NIST Thermal Infrared Transfer Radiometer (TXR) may be used to compare blackbody to NIST standard blackbody.

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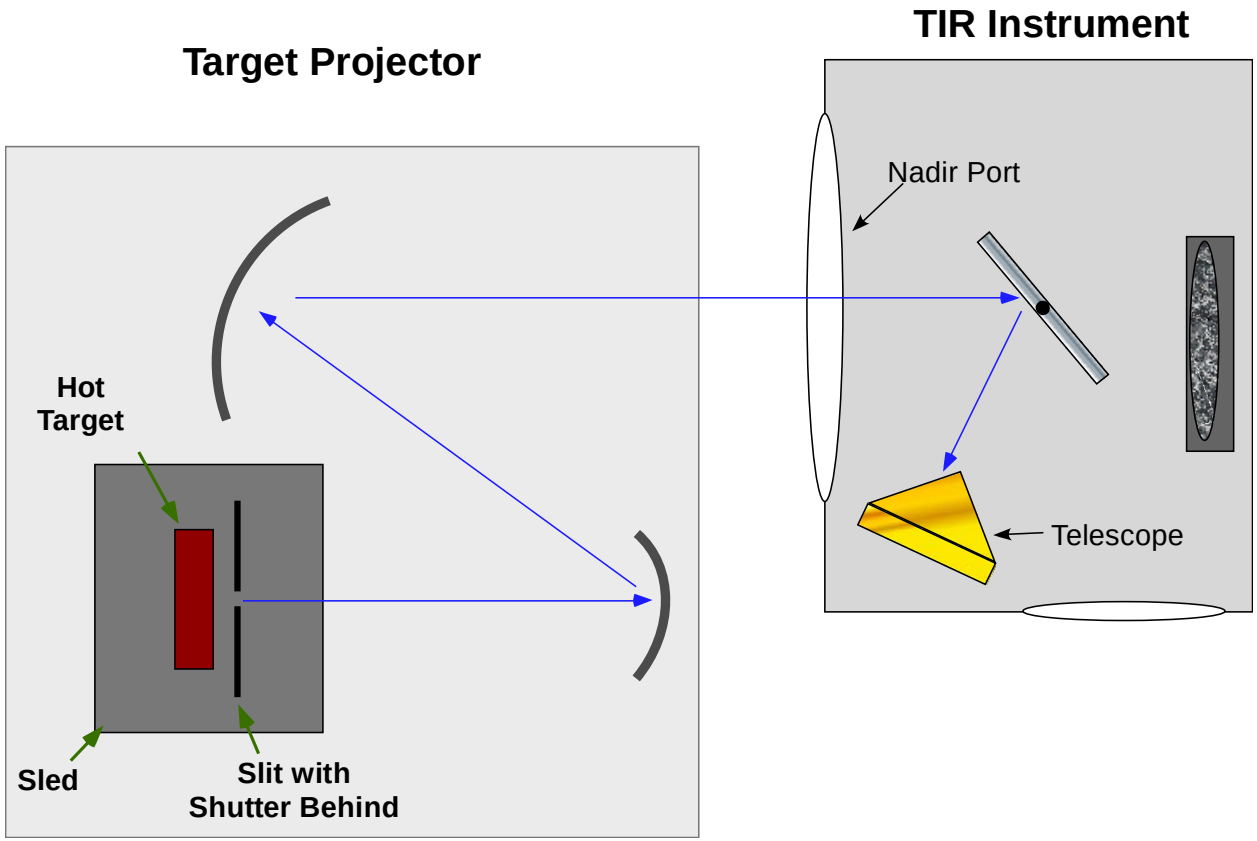
# Spatial (FOV) Calibration




- For cross-scan FOV measurements (slit out of page), TIR scan mirror will sweep slit across focal plane.
- For along-scan FOV measurements (slit vertical on page), slit will be scanned in perpendicular direction (perpendicular to page) to map out focal-plane FOV.

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# On-Orbit Calibration

- Two-point calibration, using space and an ambient temperature blackbody, will be performed every 2.3 seconds.
- Detector specs limit 1/f noise over 2.3 second period.
- Data stream will include averaged values of space and blackbody readings for each pixel.
- Nonlinearities measured during ground calibration will be incorporated into calibration algorithm (performed on ground).