

## Comparison of detector based and source based absolute radiance standards

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A detailed comparison of two separate radiometric calibration standards was conducted with analysis of error sources for each. One is a detector based standard, with radiance traceable to fundamental units using the electrical substitution method. The other is based on a calibrated field emission lamp (FEL) generating blackbody radiation. This study was motivated by the discontinuance of the FEL lamps by the manufacturer and a desire to calibrate sensors using non-blackbody spectral profiles. Three spectrometers were calibrated simultaneously by both methods to separate spectrometer artifacts from differences in the radiometric standards and error in the irradiance to radiance conversion procedure needed for the FEL. Conducting this study now is important to provide continuity between the extensive prior FEL based calibration database with a replacement method while calibrated FEL lamps are still available.

This also begins a longer term repeatability study of the spectrometers used in this work for evaluation as calibrated transfer standards, usable with both monochromatic and broad spectrum radiance sources. Eliminating the tie to the FEL blackbody spectrum with a detector based standard allows for flexibility in the illumination source. In particular, for Earth science sensors intended for use with sunlit scenes, augmenting traditional tungsten halogen lighting with blue and ultraviolet light emitting diodes allows for a better match to the solar spectrum during laboratory testing.