

# SPECTRAL EVOLUTION

## Performance Stability in Radiometric Calibration Transfer

As satellite sensors improve in precision and accuracy, the need for rigorous pre-launch radiometric calibration becomes increasingly important. A series of detailed calibrations are used to fully characterize the satellite sensors' wavelength scale, spectral response functions, pointing sensitivity, radiometric accuracy and other key parameters.

Integrating spheres show very uniform radiance distribution and are used in a range of applications for the testing and calibration of imaging and non-imaging systems such as focal plane arrays and cameras. They may be used to perform pixel gain normalization, photographic sensitometry, and remote observation system calibration., including the test and calibration of instruments for multi-spectral and hyperspectral imaging. Often the integrating spheres need calibration. Typically, shipment back to a vendor's lab is rarely practical and scientists require a way to calibrate at their location.

An ideal transfer standard, according to NIST, would have uniform and smooth power distribution with high correlated color temperature across the intended spectral range, low aging rate, uniform spatial intensity distribution, and good reproducibility. To meet the needs of integrating sphere owners who have system lamps with high operating hours, light sources more than two years old, a mandate for annual calibration, or systems too large to send out for calibration, the SR-4500 spectroradiometer from SPECTRAL EVOLUTION can be used for on-site calibration.

Lightweight and portable, the SR-4500 provides the ultimate in high performance and measurement stability across a wide range of ambient temperatures and environments. The SR-4500's measurement stability eliminates variability between various integrating spheres and retains NIST traceability. The SR-4500 includes three thermoelectrically cooled photodiode arrays and has been built to meet the needs of our customers such as NIST and NASA. The SR-4500 features:

- ◆ Spectral range of 350-2500nm
- ◆ 512 element TE-cooled silicon photodiode array (350-1000nm)
- ◆ 256 element TE-cooled extended InGaAs photodiode array (1000-1900nm)
- ◆ 256 element TE-cooled extended InGaAs photodiode array (1900-2500nm)
- ◆ Diffraction-based optics for greater reliability (no moving parts)
- ◆ Autodark current shutter and autoexposure for one-touch operation
- ◆ Fixed, metal-clad fiberoptic cable with SMA-905 input (fiber is user replaceable—4 bolts)
- ◆ DARWin SP Data Acquisition software—easy-to-use, stores data as ASCII files for use with 3rd party software, integrated energy measurement tool and allows the user to upload up to four user-defined calibration tables. LabVIEW drivers are also available



*Detailed calibrations using integrated spheres are used to fully characterize satellite instruments.*



*The SR-4500 portable spectroradiometer is designed for radiometric calibration transfer, and covers the spectral range from 350-2500nm.*



*Comparison of detector stability for an SR-4500 versus a typical full range spectroradiometer. Blue and orange lines represent the spectroradiometer; the gray and yellow the SR-4500.*

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