

# SPECTRAL EVOLUTION

## Technical Note: NER

Noise Equivalent Radiance (NER) is a measurement of the amount of signal to noise from a spectroradiometer calibrated for radiance with a traceable standard. The lower the NER value, the more sensitive the spectroradiometer is. Noise is represented by the variation in the signal response for repeated measurements on the same stable sample. In general, noise limits the accuracy and precision of all instruments.

NER is measured as the input radiance to an optical sensor that produces an output SNR (signal-to-noise) of 1. It is a useful measurement when comparing the sensitivity of different spectroradiometers.

What's the difference between resolution and NER and how will it affect my research?

Resolution determines the spectral features that can be separated and is usually measured at full width/half maximum (FWHM).

Instruments with the lowest NER specifications will produce the most precise spectra, especially under low light conditions or with unusually dark samples.

Of course, the ultimate goal is to deliver high resolution and high sensitivity for a field application in remote sensing whether it be ground truthing hyperspectral data, vegetation studies, canopy research, soil characterization, plant species identification, or any similar remote sensing application.

Spectral Evolution's spectroradiometers deliver the highest resolution and sensitivity available in a field instrument. Measured at FWHM, the PSR+ delivers the following resolution:

3nm@700nm  
8nm@1500nm  
6nm@2100nm

The PSR+ field spectroradiometer has the following NER specifications across its 350—2500 nanometer range:

$0.5 \times 10^{-9}$  W/cm<sup>2</sup>/nm/sr @400nm  
 $0.8 \times 10^{-9}$  W/cm<sup>2</sup>/nm/sr @1500nm  
 $1.0 \times 10^{-9}$  W/cm<sup>2</sup>/nm/sr @2100nm

This is more than eight times quieter than the highest resolution competitive field spectroradiometers for remote sensing applications. When combined with auto-shutter, auto-exposure and auto-dark correction, the PSR+ delivers the benefits of sensitivity, high performance, and one-touch operation. Our spectroradiometers are designed with photodiode arrays for no moving optical parts. This provides the high in-field reliability most applications require in addition to resolution, sensitivity and noise floor.



*The PSR+ , our most popular field spectroradiometer, uses one 512 element silicon photodiode array and two InGaAs extended photodiode arrays to cover the full 350-2500nm spectral range with the highest resolution and sensitivity in a field handheld spectroradiometer.*



*The PSR+ and all our spectroradiometers are designed for reliability in the field with no moving optical parts to breakdown.*

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