High Quality Resolution in Photon Counting

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Categories:
- Chemistry and Chemical Analysis
- Electrical Engineering

Keywords:
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- Data Processing
- Electrical Engineering
- Photons

Photon, ion, and particle counting can offer substantial signal to noise improvements in the detection of weak signals by removing thermal noise, baseline drift, and noise from variation in detector gain. In this basic application, a photon count is recorded for each transient exceeding a discriminator threshold. Paralysis or counting based on photon bunching introduces two sources of measurement bias because two or more time-coincident photons will only register as a single photon, and the temporal response function of a detector imposes a time delay for voltage to recover before another count can be recovered. Responses to these problems have been limited in scope, and response functions exist that would not be filtered with any available technique.

Researchers at Purdue University have addressed these problems by developing a novel technology that maximizes the resolution between events in particle counting. The technology includes an approach to deconvolution that uses an evaluation based on digital filters derived from linear discriminate analysis (LDA). LDA is a supervised approach for separating high-dimensional data into distinct classes, and a digital filter targets recovery of a sharp impulse for a detector impulse response function. Although the application of the technology is photon and ion counting, the technology can be extrapolated to broader applications in high-speed data transmission.

Advantages:
-Increases accuracy of photon and ion counting
-Decreases error of paralysis counting caused by time-delay and voltage recovery

Potential Applications:
-Photon and ion counting
-High-speed data transmission

People:

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Intellectual Property:

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