

Pulse System for SEM

The Pulse system is a modular and retrofittable upgrade to improve the speed and precision of scanning electron microscopy signals. At its core, it streams the analog signal from a detector, including those using scintillator based technology, identifies individual detection events and returns a fully digital output.

Advantages

- Connects to any acquisition system accepting TTL digital inputs.
- Produces quantifiable images with true zero dark level and pure Poisson noise.
- Acts alongside existing detectors for simultaneous acquisition of images, including spectroscopy.
- Features two channels for electron counting on two separate detectors.

Specifications

No. channels	2 (2 inputs, 2 outputs)
Connections	BNC
Input range	Max. ± 10 V
Input resolution	14-bit
Input impedance	50 Ω
Sample rate	125 Msps (per channel)
Output voltage	5 V TTL, 3.3 V CMOS
Output frequency	Max. 62.5 MHz
Power	5 V, 2 A (USB-C)
Control interface	RJ45 ethernet

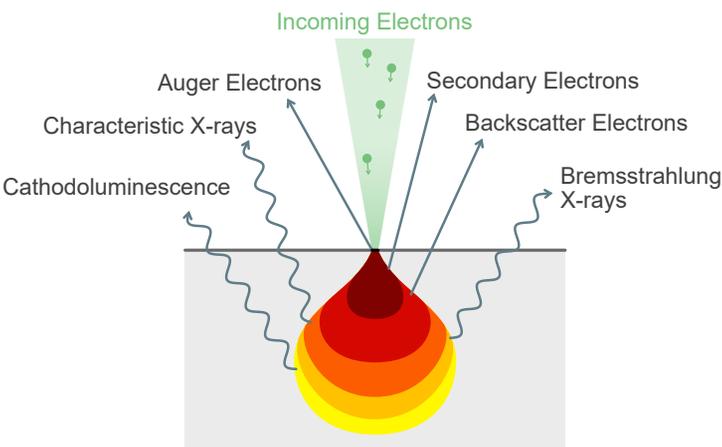
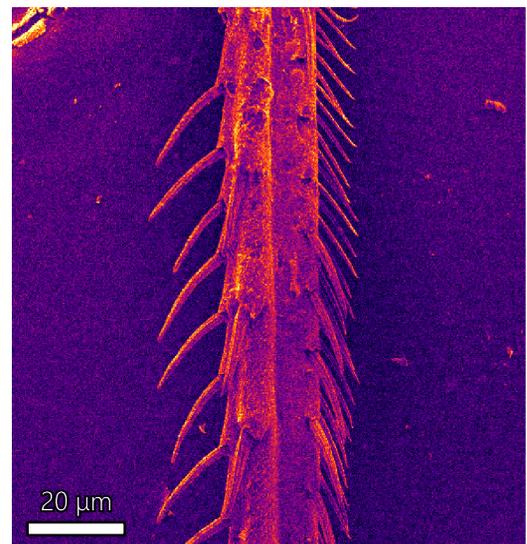
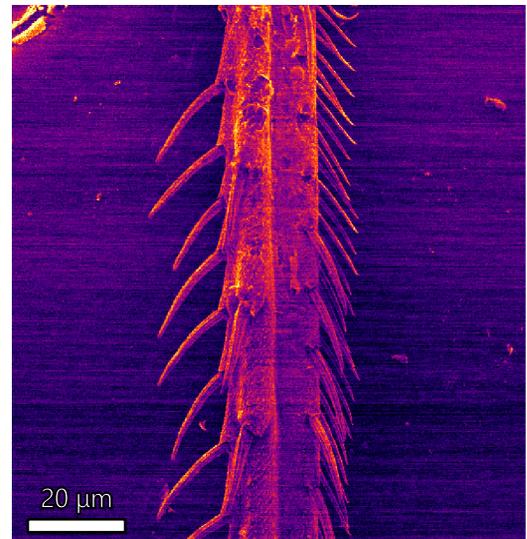


Figure 1 Schematic of the signals generated by the SEM electron beam, and their corresponding interaction volumes.

Figure 2 Secondary electron image comparing the raw analog signal (top) and Pulse (bottom). Acquired from a Zeiss Evo system and point electronic DISS6 scan controller.

Pulse System

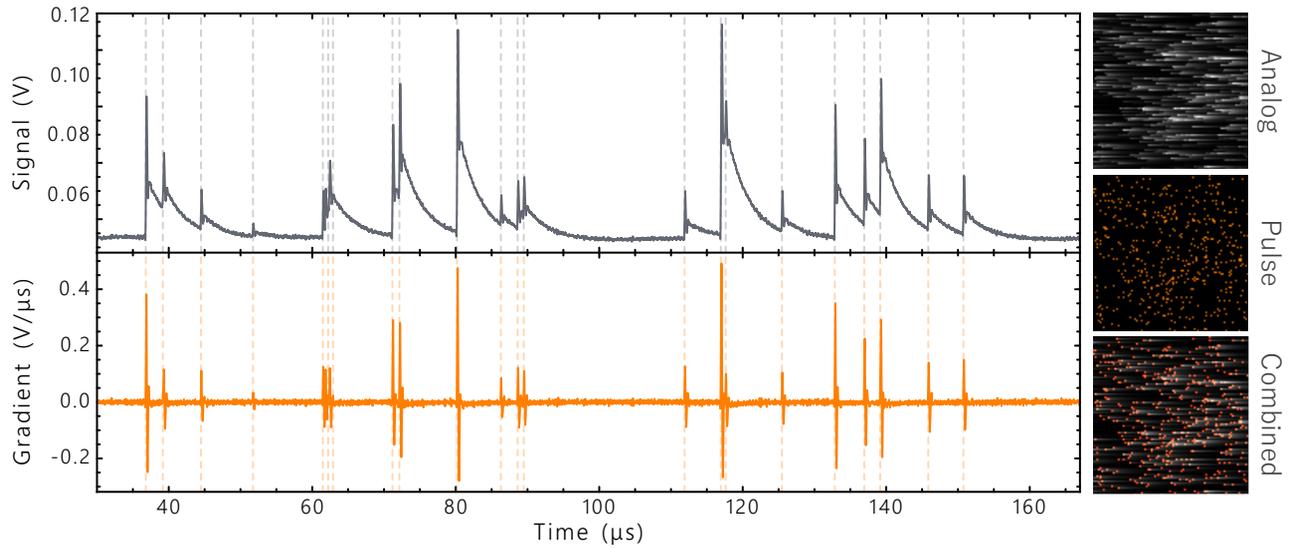


Figure 3 Raw data stream from a scintillator Everhat-Thornley detector (top) and differentiated signal (bottom). Vertical lines show detected electrons. Right shows high-speed, low-dose images from analog and Pulse detection, showing improved temporal response when using Pulse.

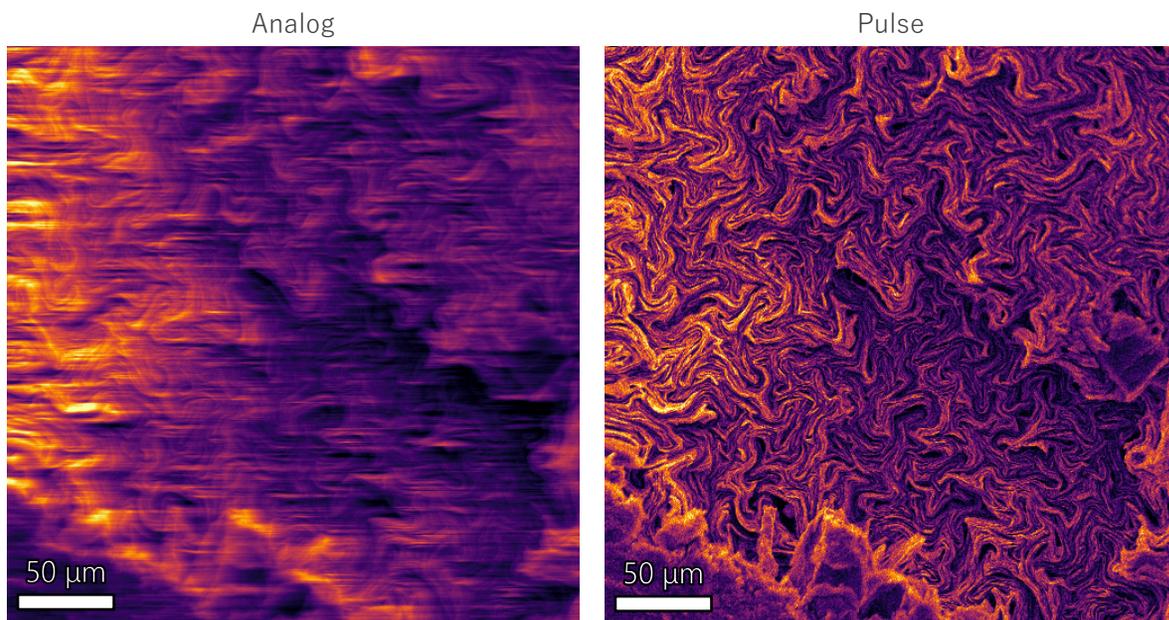


Figure 4 Image of a pencil lead acquired using the analog (left) and Pulse (right) signals. Slow streaking into the vacuum can be observed in the analog signal.