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INVITED: Position-sensitive detectors and their readout as an enabling technology for high-energy astrophysics

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The progress in high-energy astrophysics is driven by two engines: deepening and development of the science objectives, and the progress in the measurement techniques, supported by the available detectors. The detectors in astrophysical instruments carry out 3 basic kinds of measurements: timing, spectral, and position. However, in most cases, these must all be accomplished within one detector.

First, I will introduce the basic principles of the instruments used in the modern ground-based and space/balloon-borne astrophysical missions. Next, I will make a quick tour through the development history of position-sensitive detectors, and ultimately I will focus in detail on the modern semiconductor detectors (silicon, germanium, and CZT), gaseous and liquid detectors, and scintillator detectors. Special attention will be given to the development and role of the detector readout: silicon photomultipliers, application-specific integrated circuits, and field-programmable gate arrays.

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