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## **Matching detector performance to source profile to optimise detector linearity**

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A single photon counting hybrid detector is investigated, especially with respect to linearity, maximum counting rate and dead time. These characteristics are crucial for advanced new detectors for any application and find ideal application in high-performance synchrotrons. We show that the matching of the detector response function with the temporal source structure leads to dramatic improvements in efficiency, count rate and linearity. Results are of wide application. In particular, the approach can be applied to sources used for high-accuracy fundamental experiments including Electron Beam Ion Traps (EBIT) and characteristic calibration sources.

**Primary author:** Dr SOBOTT, Bryn (The University of Melbourne)

**Co-author:** Dr RASSOOL, Roger (The University of Melbourne)

**Presenter:** Dr SOBOTT, Bryn (The University of Melbourne)

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