

PIImMS1 and PIImMS2, monolithic CMOS event-triggered time-stamping image sensors with storage of multiple timestamps at 25ns resolution

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PIImMS, or Pixel Imaging Mass Spectrometry, is a family of high-speed monolithic CMOS imaging sensors tailored to the requirements of mass spectrometry and allied fields. PIImMS pixels each compare step events of collected charge to an adjustable threshold, storing up to four significant events inside the pixel as 12-bit timestamps with a time resolution of 25ns. The pixels may be individually trimmed to improve the uniformity of response. The pixels are relatively complex, each containing over 600 transistors and measuring 70 μ m by 70 μ m. The first generation of these sensors, PIImMS1, has an array of 72 by 72 pixels, while PIImMS2 provides a larger sensor area with 324 by 324 pixels and several new features. We will present an overview of the pixel and sensor architecture, as well as presenting recent characterisation and application results for PIImMS1 and first characterisation results for PIImMS2.

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