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# Flash X-Ray Imaging in Impact Dynamics: A Comparison of TimePix Detector with Photodiode and High-Speed Camera Systems

This study investigates the imaging performance of the TimePix3 chip for high-speed X-ray imaging, with a focus on its potential application in impact dynamics, specifically in gas-gun experiments combined with a flash X-ray system. The flash X-ray system used is the MAT 300-4C (Scandiflash, Sweden), which generates four discrete X-ray bursts with an exposure time of 20 ns, within a voltage range of 100-300 kV and a discharge current of 10 kA. To evaluate the TimePix chip's performance, we compare its capabilities with those of traditional detection methods, including signals from a scintillation panel captured by high-speed photodiodes and a high-speed camera. The photodiode signal acts as a high-speed reference for the study, while the high-speed camera is used for capturing the representative X-ray images. The TimePix photon counting detector, with its high spatial resolution and particle detection and traction, represents the primary system under evaluation for its suitability in capturing fast, dynamic X-ray events during high-speed impacts. We assess key performance factors, including detection capabilities, overexposure shielding, temporal resolution, signal fidelity, decay characteristics, and spatial accuracy. This comparison aims to determine the viability of the TimePix chip for high-speed X-ray imaging in the context of impact dynamics and provide insights into its potential for future applications in real-time X-ray imaging of penetration or ballistic events.

## Workshop topics

Applications

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