

Research progress of ultrafast photoelectric diagnostics in XIOPM CAS and its application prospect in HED physics

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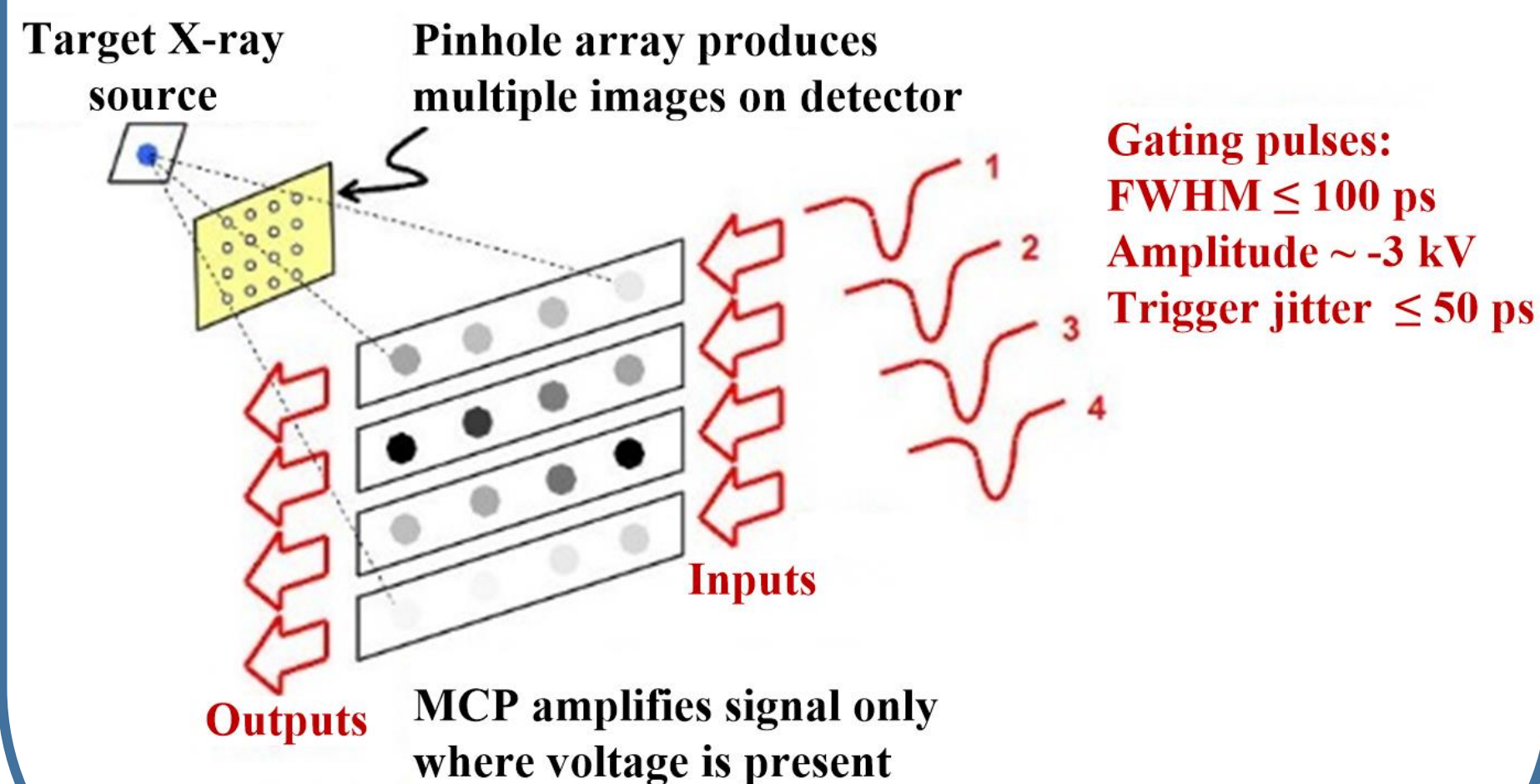
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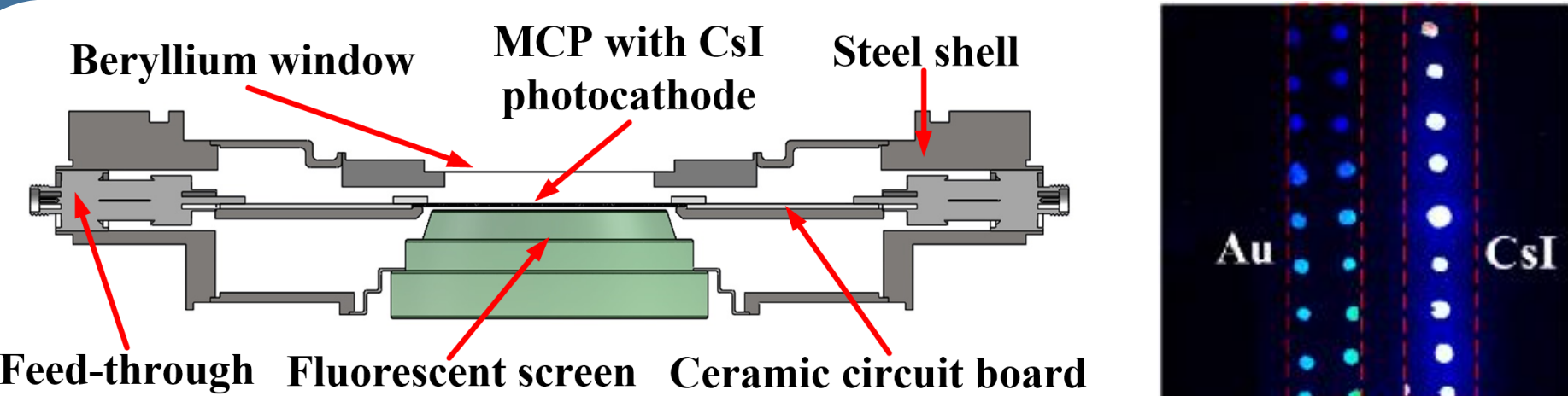
Introduction

The gated X-ray framing cameras with picosecond temporal resolution and micron spatial resolution are indispensable two-dimensional diagnostic instruments for inertial confinement fusion (ICF) and high-energy density (HED) physics research. The ultrafast photoelectric diagnostics group in XIOPM CAS has been committed to developing cutting edge framing technology for decades to achieve higher detection efficiency, shorter exposure time and to detect photons with higher energies.

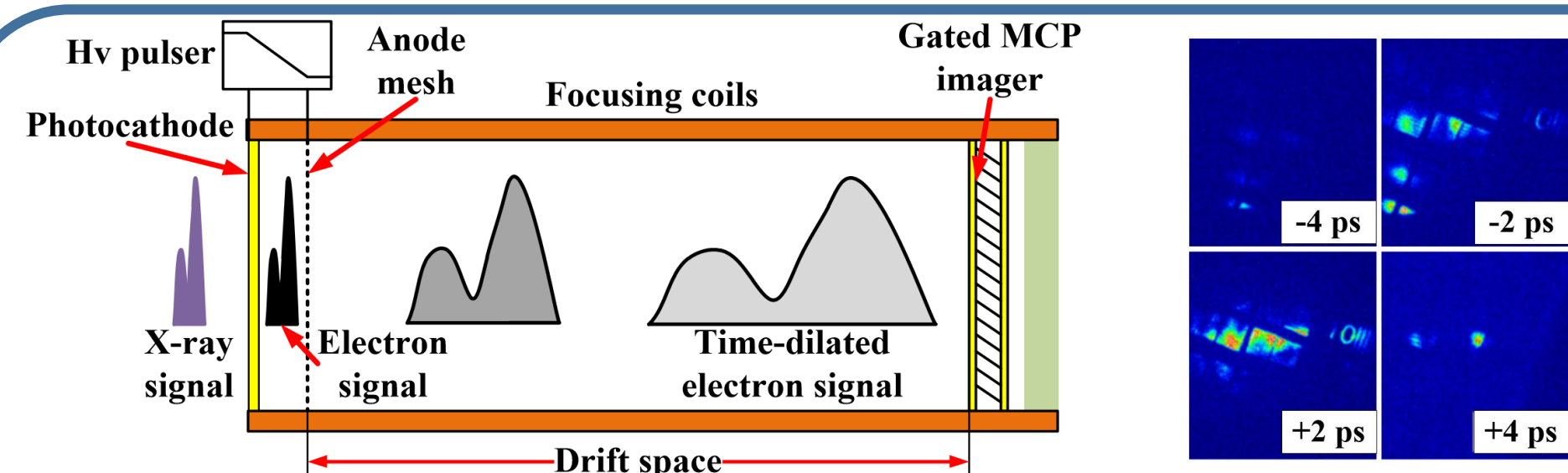


Principle of gated X-ray framing camera

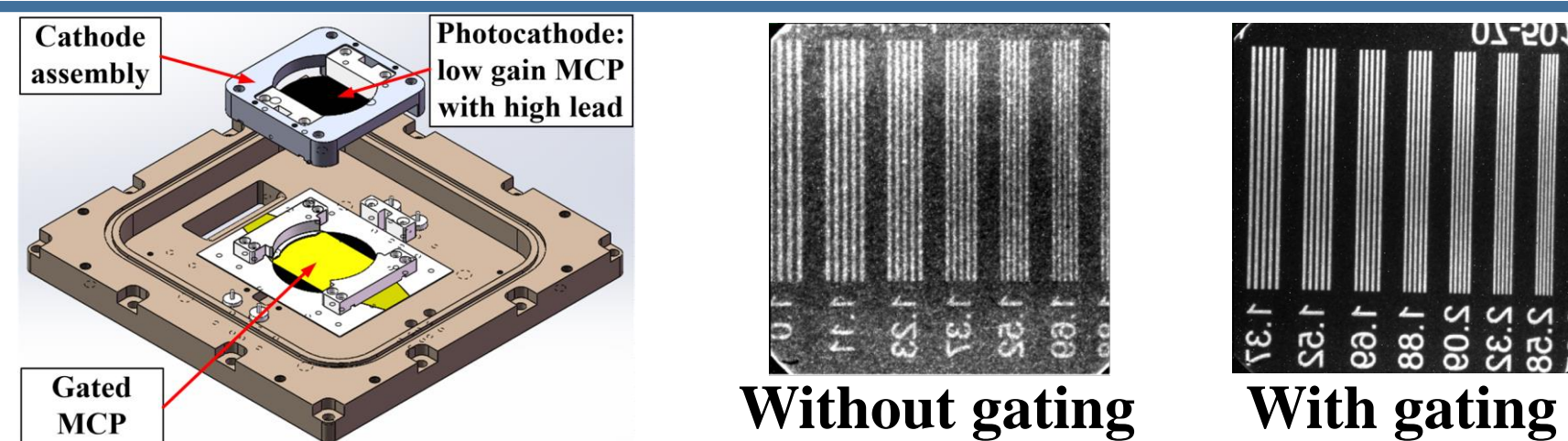
Developments at XIOPM



Higher detection efficiency: A hermetically sealed MCP imager with CsI photocathode is developed, whose detection efficiency is 13 times higher than traditional imager.

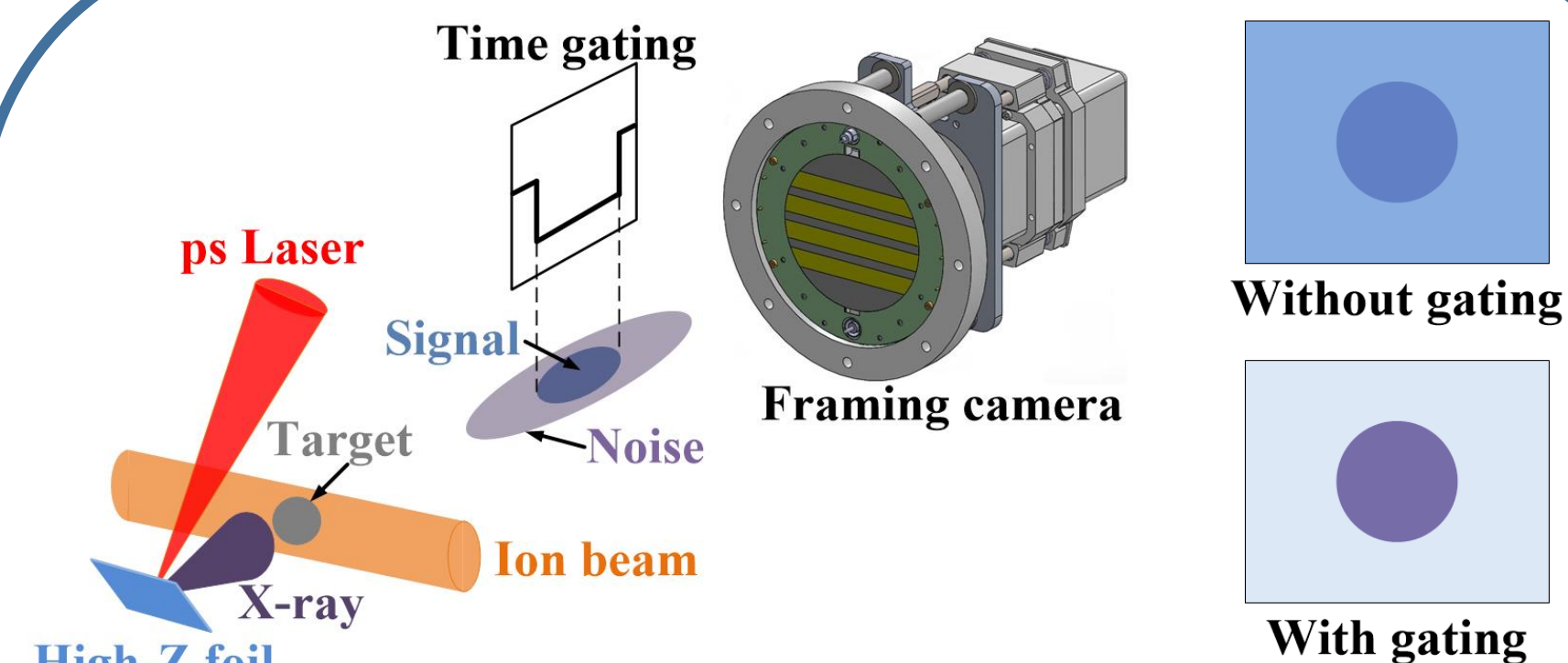


Shorter exposure time: Pulse dilation technology has been adopted to achieve a temporal resolution of 5 ps.

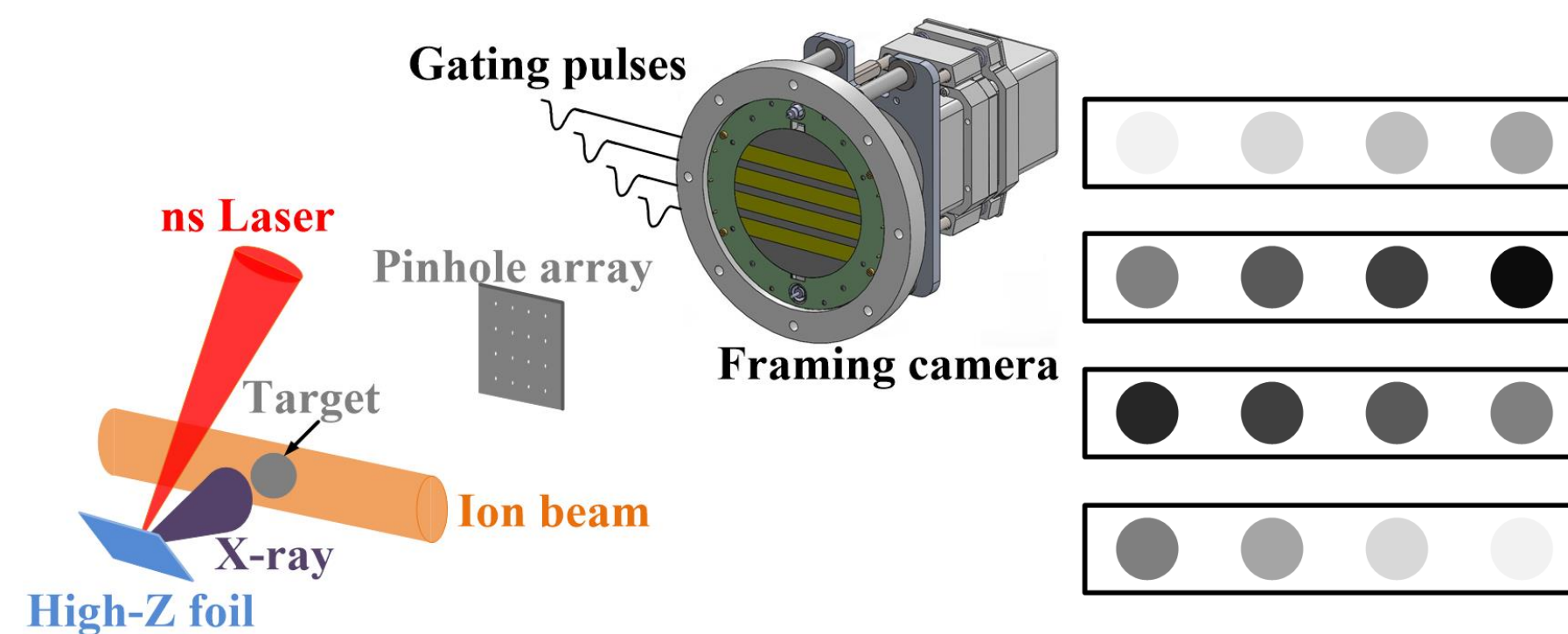


Detecting higher energy photons: A dual MCP framing camera is developed, which is sensitive to photons with energies higher than 50 keV.

Application prospect in HEDP



Using a gated framing camera as the detector will improve the signal-to-noise ratio of backlight images.



Combining gated framing camera with X-ray optical components, multiple time-resolved images can be obtained within one single shot, which makes it possible to explore the hydrodynamics of HED matter.