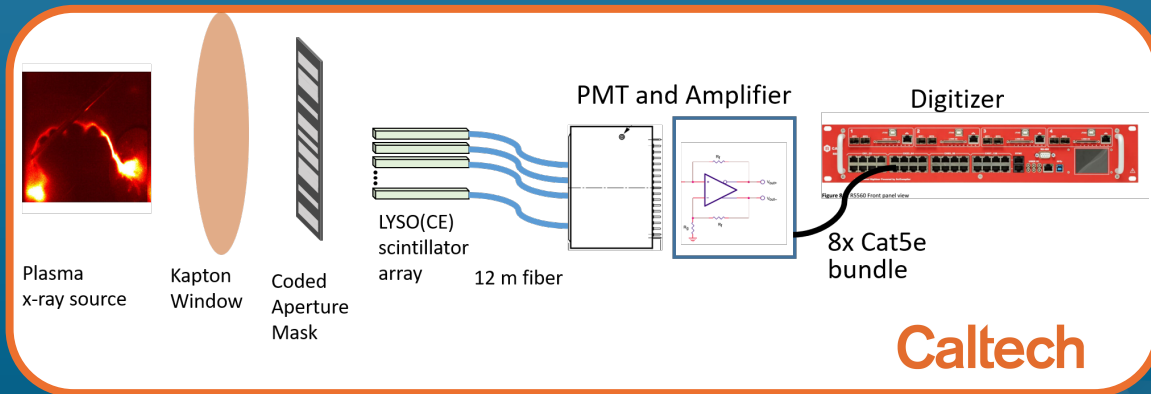


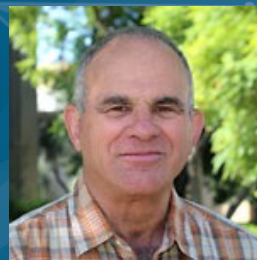
1D Coded Aperture X-ray Camera - Pasadena, California

Caltech

- Take high-speed 1D X-ray movies
- S/N much better than pinhole



Contact(s)	Paul Bellan, pbellan@caltech.edu Seth Pree, sethpree@caltech.edu
Key References/Links	Visible-light prototype described in Haw and Bellan, Rev. Sci. Instrum. 86 , 043506 (2015), https://authors.library.caltech.edu/57176/1/1.4917345.pdf Group: http://www.bellanplasmagroup.caltech.edu



PI: Paul Bellan

Key Information

Physical Property to be Measured	Image X-rays with both space and time resolution
Technique	Imaging via coded aperture on scintillator array
Plasma parameter range	Any plasma that produces x-ray pulses
Resolution (time)	40 ns (determined by current scintillator's fall time) Can be reduced to 8 ns with faster scintillator
Resolution (space)	Camera has 128x1 pixels on a 1-mm pitch. Resolution is determined by mask element size ($> 300 \mu\text{m}$)
Sensitive Spectrum (energy)	5–100 keV+ (depending on mask material)
Interface	Diagnostic is controlled by a laptop. Triggering can be done with a TTL signal.
Suitable for MCF, ICF, MIF?	MCF, MIF, marginally suitable for ICF depending on duration
Form factor: transport	The camera head and attached fiber bundle need to be shipped in a box which is $\sim 3' \times 2' \times 1'$. Amplifier and digitizer have a combined size comparable to a desktop PC.
Form factor: operation	Camera head is located near plasma and requires installation of an x-ray transparent vacuum window with line of sight to plasma. Amplifier and digitizer are electrically isolated by 12 m of optical fiber and can be mounted in 10U of a 19" computer rack.
Set-up time	1 day
Maximum record time	64 μs at maximum sample rate. Digitizer can record 8000 samples/event.
Minimum time for a conclusive physics measurement	This is a single-shot measurement, but a conclusive measurement may require many shots to adjust alignment and gain.
Minimum plasma duration or # of pulses a good measurement	For a video, the plasma should exist for more than ~ 100 ns. For plasma durations shorter than the resolution, the detector can generate a 1-frame, 1D image of x-ray bursts.