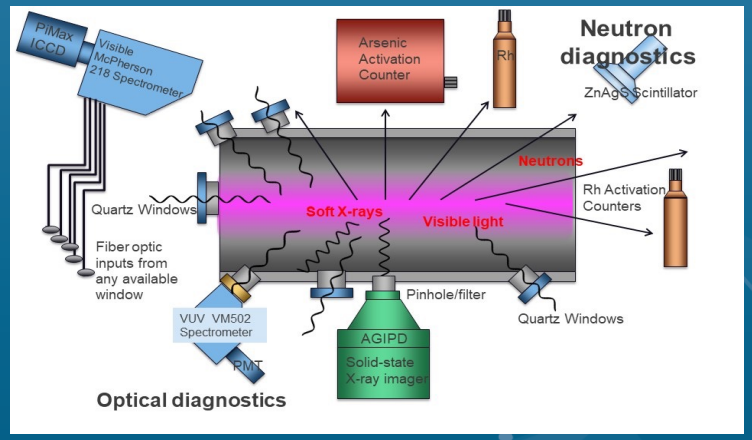
Soft X-ray, EUV spectroscopy, Neutron, & Fast-Imaging Diagnostics - Los Alamos, NM

Los Alamos NATIONAL LABORATORY | National Nuclear Security Administration

A variety of proven soft x-ray, neutron, EUV flux and spectroscopic measurements, along with fast imaging



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Key References/Links	G. C. Idzorek, W. L. Coulter, P. J. Walsh, and R. R. Montoya, "**Soft x-ray diagnostics for pulsed power machines**," LA-UR-95-2336; CONF-950750-18, Aug. 1995. https://www.osti.gov/biblio/102382. G. A. Wurden and S. K. Coffey, "**A multi-frame soft x-ray pinhole imaging diagnostic for single-shot applications,**" *Rev. Sci. Instrum.* **83**, 10E516 (2012), https://doi.org/10.1063/1.4733536. R. E. Chrien, **Neutron calibration for the FRX-C/LSM magnetic compression experiment,** *Rev. Sci. Instrum.* ***62****, 1489 (1991),* https://doi.org/10.1063/1.1142473.

Key Properties	
Physical Property to be Measured	X-rays, neutrons, visible and extreme ultraviolet emission from plasmas. Dynamic evolution (imaging).
Technique	Spectroscopy, fast imaging, filtered PMT's and photodiodes, neutron activation (arsenic and rhodium)
Plasma parameter range	10^{13}-cm^{-3} electron density or higher. 10^5 neutrons/pulse or higher. 100-eV electron temperature or higher
Resolution (time)	Seconds to nanoseconds (flux dependent), or time-integrated
Resolution (space)	Depends on sightline, geometry, and/or pinhole diameter
Resolution (energy)	For x-rays, depends on choice of filter sets. Aluminum, Titanium, Nickel, Beryllium. From 10 eV to 10 keV. Ratios of x-ray measurement for electron temperature estimates.
Interface	50-ohm outputs to digitizers, 100-MHz preamplifiers. 12–16-bit dynamic range. Hardened to allow microamp level signal detection in the face of pulsed power noise backgrounds. Vacuum flange access required for x-ray and EUV, and pump-out protection for micron thick metal/plastic foils.
Suitable for MCF, ICF, MIF?	Yes
Form factor: transport	Various / LANL shipment
Form factor: operation	Works with user data acquisition systems, although cameras come with stand-alone control computer (ethernet or USB)
Set-up time	Appropriate vacuum access and mechanical interface is the limiting factor for EUV and x-rays. Neutron detectors stand alone. Shielding of low level signal lines and preamps is essential.
Minimum time for a measurement	Two weeks, once it arrives at your facility. Data available on each pulse
Other characteristics	Best used with other measurements (visible, density, magnetics)
Special considerations	Motion of the plasma, or plasma contamination and/or destruction of foils can be a complicating issue.

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