XRA-700
Detector Array

PLEIADES™



XRF DETECTORS:
STATE OF THE ART PERFORMANCE

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Amptek is excited to introduce our new

PLEIADES MULTI-DETECTOR ARRAY

for XRF applications.

The XRA-700 is a multichannel X-ray spectroscopy system, with seven high-performance X-ray detectors and low noise preamplifiers and a control unit with power supplies and cooling. Building on Amptek's history of producing the widest range of X-ray detectors, the XRA-700 can house any combination of Amptek detectors for unprecedented flexibility in configuring your experiment. The XRA-700 is compatible with standard third-party digital pulse processors.

The standard array consists of seven 70 mm^2 FAST SDD® silicon drift detectors with 130 eV FWHM (typical) at the Mn K_α line at 1 µs T_{peak}. These operate at an input rate over 1 Mcps with a peak-to-background ratio >20,000:1 and minimum spectral interferences. Other options include:

- 70 mm^2 FAST SDD with a C2 window (40 nm of Si_3N_4) for detecting X-rays down to the Be K_α line.
- 1 mm thick 70 mm^2 FAST SDD for up to 2x better intrinsic efficiency at high energies.
- CdTe detectors with good efficiency up to 100 keV.

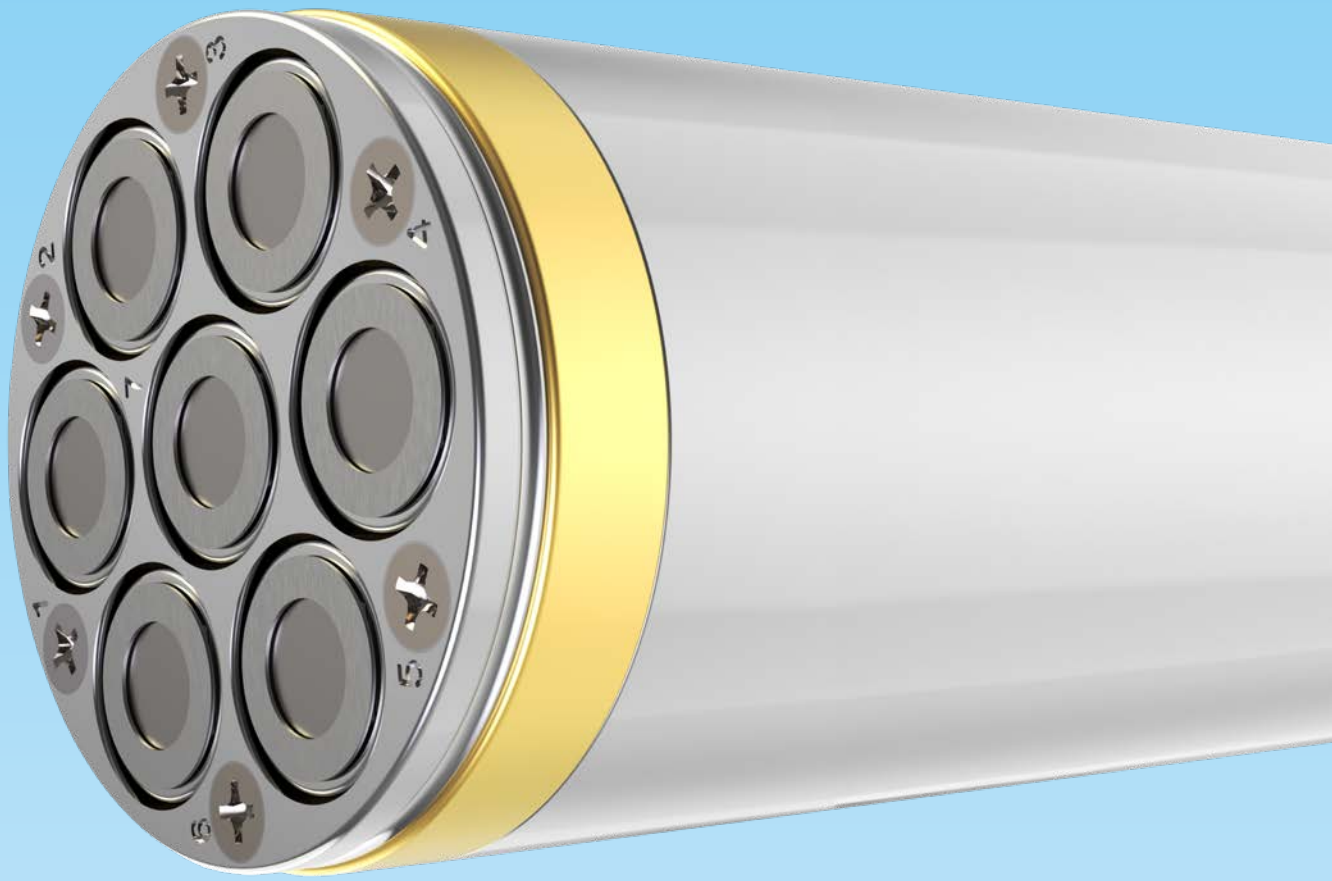
Any XRA-700 system can be configured with seven identical detectors, or for any combination of the detectors, to better optimize the sensors for a particular measurement. You can mix and match detectors during the purchase process or can reconfigure over the lifetime of the product.

The XRA-700 uses seven standard, stand-alone, hermetically sealed detector modules for the best reliability, maintainability, and flexibility. The sealed modules maintain vacuum for years without pumping. Should one detector exhibit a problem, the rest of the array can continue to be used and the failed unit can be replaced, in your facility, using standard production modules. This also allows the system to be upgraded or reconfigured, in the field, for changing test requirements.

The XRA-700 design allows individual detector repair.

The XRA-700 control module provides power (low voltage, high voltage) and control of the thermoelectric coolers. It includes USB, Ethernet, and RS-232 interfaces to set and monitor these values but, once configured in software, it will operate without connection to a computer ("set and forget" mode). EPICS support is available, along with a cross-platform SDK. There are seven preamp outputs, which are compatible with most third-party DPPs.

The standard XRA-700 uses seven detectors mounted on an extender that is 30 cm long and 5.0 cm OD; other options are available. Please contact Amptek to discuss customization.



Highlights

- Contains seven high-performance X-ray spectroscopy detectors with unequalled flexibility. Each XRA-700 can be configured to mix-and-match Amptek's X-ray spectroscopy detectors:
  - 70 mm^2, 0.5 mm thick FAST SDDs: 130 eV FWHM at Mn K_α at T_{peak} of 1 µs, input count rates > 1 Mcps.
  - 70 mm^2 FAST SDD with C2 entrance window (40 nm of Si3N4) for light element detection.
  - 1 mm thick, 70 mm^2 FAST SDD for up to 2x intrinsic efficiency >15 keV.
  - CdTe detectors for high efficiency up to 100 keV.
  - The XRA-700 can be reconfigured for different detector options in the field.
- Based on standard, stand-alone, hermetically sealed detector modules for the best maintainability, reliability, and flexibility. No vacuum pump is needed. Detector modules can be replaced in the field.
- Control module provides power and cooling. Can be used in "set and forget" mode or the XRA-700 can be monitored via USB or Ethernet interfaces, using EPICS, an SDK, or a standard app.
- Control module provides preamp outputs that are compatible with most third-party digital pulse processors.
- Flexible system design, allowing customization for the most challenging requirements and applications.

Front and rear view of a typical Pleiades Array configuration



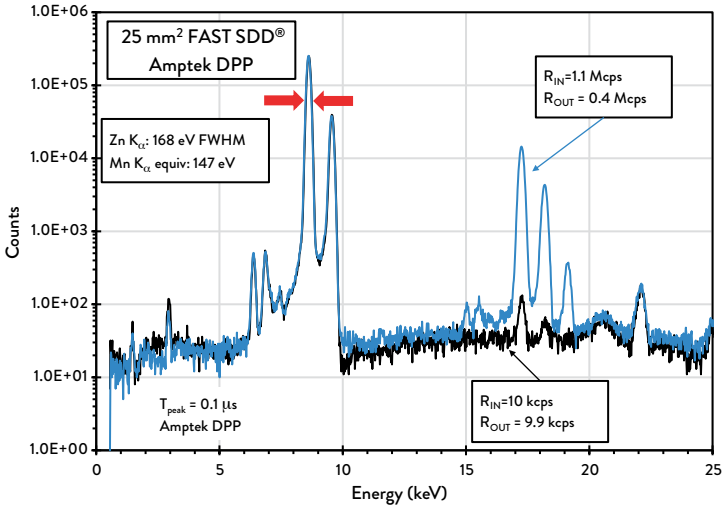
Front view shows 7 x 70mm FAST SDDs with C2 windows, maximizing detector area for low-energy spectra.



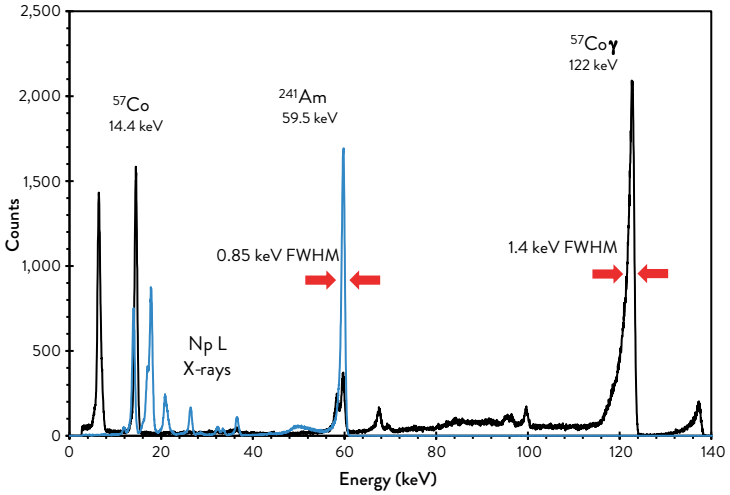
Rear view shows the individual BNC connectors, plus power supply and data connections for setup and control, and mode button.

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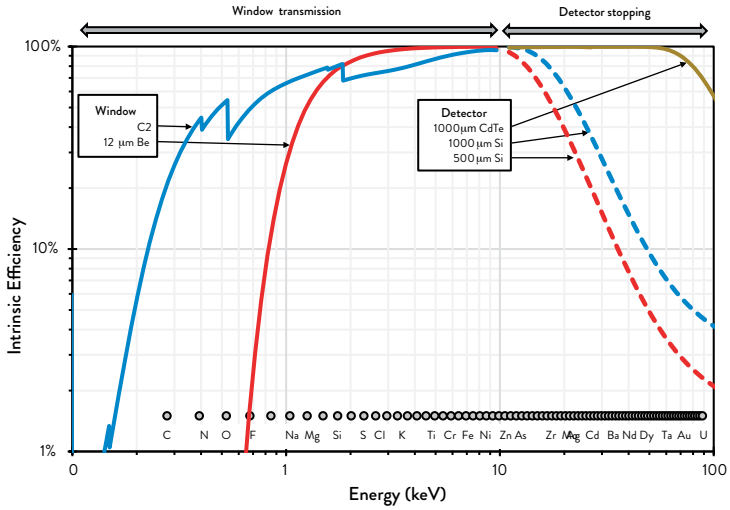
Spectra Plots



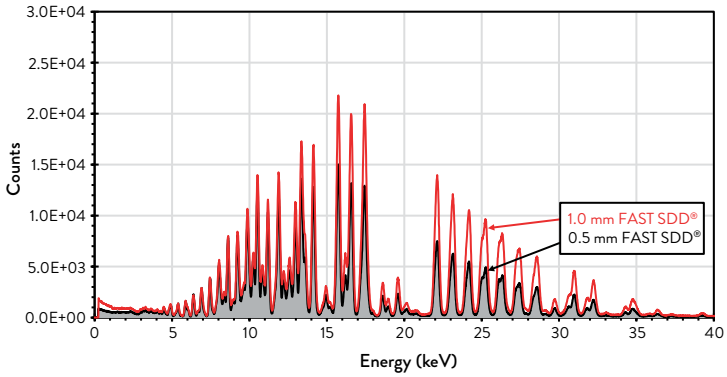
High Rate Spectra
Typical spectra from a FAST SDD that shows excellent resolution at high count rates and low background noise, facilitating detection of the smallest concentrations of elements possible with XRF.



CdTe Spectra
Typical spectra from a CdTe detector that enables heavy element detection.



Attenuation Spectra
Compound graph of different window transmission (C2 allows transmission of lightest elements) and detector stopping efficiency for all detector types available (regular FAST SDD, 1mm thick FAST SDD and 1mm thick CdTe).



1 mm Spectra
Compound spectra showing the benefits of the 1mm thick FAST SDD. Up to 2x the stopping power for elements >15keV, with no loss of performance for lighter elements compared to regular FAST SDD. Excellent for rare earth elements

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