

The new FMB Oxford APD detector is an ultra-fast detector system using an avalanche photodiode, for X-ray scattering experiments up to 20keV.

It offers the ultimate in speed, resolution, efficiency and noise levels whilst maintaining a robust and easy to use architecture; making it ideal for experiments with a large dynamic range, time resolved measurements and fast photon counting.

The system requires an APD detector head, signal processing electronics and a signal cable. This section details the APD detector head and the two processing modules offered by FMB Oxford.

Avalanche Photodiode Detector Head

The FMB Oxford APD Detector Head contains a 5mm x 5mm silicon reach-through avalanche photodiode shielded by a Beryllium window, with integrated preamplifier, in a housing, together with a 5m cable for connection to the signal processing and control module.

Features*

- excellent pulse pair time resolution - 5.6ns
- very low noise
- wide dynamic range and linearity - seven decades
- rapid recovery from pulses
- high photon efficiency - 95% at 6keV; 45% at 12keV

Specifications

Maximum count rate	100MHz *
Diode area	5mm x 5mm
Window	70µm Kapton
Housing dimensions	26mm x 20.85mm x 55mm (L)
Photon efficiency	50% that of NaI up to 10keV *
Noise	below 1Hz *
Diode gain	200x at 370V bias
Preamplifier gain	60dB per stage at 100MHz
Rise time 10%-90%	<2ns *
FWHM	<4ns *

**Indicative performance figures obtained at the National Synchrotron Light Source, Brookhaven National Laboratory*



Ordering Information

APD Detector head and cable only

APD-0001

APD Prime Electronics

The Prime electronics package, built to a design developed at the Brookhaven National Laboratory, offers the user a basic electronics package to use with the APD detector. The unit supplies the bias voltage for the APD head and a constant fraction discriminator output.

Specifications

NIM module	one unit wide
HV APD bias output	0 – 400 V
Constant fraction discriminator	TTL output into 50Ω
Amplifier output	0 to -4V
Maximum count rate	100MHz



Ordering Information

APD Prime Electronics package only

APD-0003

Cable - 10m

CBY-1502

ACE APD Electronics

The ACE electronics package, built to a design developed at the European Synchrotron Radiation Facility offers the user maximum flexibility; it supplies the bias voltage to the detector head, and has an integrated counter/timer which can be operated in local (front panel) or remote (computer controlled) mode.

Features

- front panel operation through a user-friendly LCD graphic display with touch panel
- easy user interface for remote operation mode
- up to 500V diode bias
- very low noise
- rugged, reliable package
- wide dynamic range and linearity - seven decades
- Labview software is provided and can be utilised with the rs232 communication port for remote configuration and data retrieval

Specifications

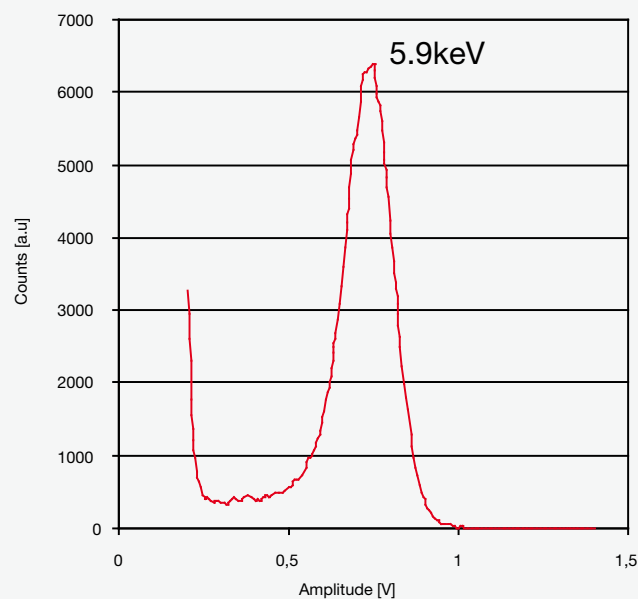
NIM module	two units wide
Selectable modes	local (front panel,) remote
Remote connection	serial or parallel
Maximum count rate	up to 100MHz
HV APD bias	up to 500V
Remote mode	software included
Energy resolution	20% to 35% at 25keV



Ordering Information

ACE Electronics package only	APD-0002
Cable - 10m	CBY-1502

APD System Performance Data



The graph to the left shows a pulse height distribution of a ^{55}Fe source (5.9KeV) recorded using the ACE APD electronics.

The electronics module was set in window mode - to resolve the distribution a window of 10mv was used for a good compromise between count rate and resolution. The high voltage photodiode bias was set to 300V, the integration time 1s and the lower level discriminator threshold 0.2V.