APS Detector Pool

P. Ilinski

XFD

APS Detector Pool Mission

increase quality and efficiency
of experiments at the APS by:

- providing (eventually) a broad range of detectors
- making expensive detectors available
- increasing efficiency of detector usage

Detector Pool objectives

- acquire, maintain, calibrate and characterize in-house detectors
- provide detector expertise and troubleshooting support
- evaluate commercially available detectors
- detector R&D (modification of existing detectors and development of novel detectors)
- serve as a focal point representing the APS community in interactions and information exchange with other US and international facilities

Resources

- Staff
  - Petr Ilinski (ilinski@aps.anl.gov) - overall operation, counting and energy dispersive detectors
  - Brian Tieman (tieman@aps.anl.gov) - area detectors, software development
- Laboratory space - L0119 (ground floor Bldg. 401)
- Inventory
  - Budget
  - Donations - voluntarily, mutual benefit
  - Fees ?

Activities

- Maintenance
  - maintenance of DP detectors
  - calibration, troubleshooting and repair of DP and users detectors
- Evaluation
  - commercially available
  - novel or custom made detectors
- Development
  - detectors/electronics development
  - software development
- Service contracts
  - consolidation of service contracts?

Operation

- Dialogue
  - prefer to discuss detector usage before a reservation is made
  - round tables, meetings, mailing list, web site
- Reservations
  - on-line data base for detectors reservations and status
  - in advance reservations are preferable
  - resolving time conflicts
- Responsibilities
  - detectors will be monitored before, during and after usage for performance and correct handling
  - Detector Pool will be liable for its detectors

Potential detectors

Unit price	Counting detectors	Area detectors
up to $10,000	Various PIN APD, SDD diodes scintillation counters ion chambers	Room temperature CCDs and accessories (objectives, scintillating crystals etc.)
$10,000 Š $30,000	Single element energy dispersive detectors	Peltie cooled CCDs
$30,000 - $100,000		Advanced CCD cameras for imaging diffraction
> $100,000	Multi-element energy dispersive detector Wavelength spectrometer	CCD 4Kx4K pixels Image plate
?	Novel detectors (calorimeters, STJ)	Pixel detectors

Questionnaire

- Purpose
  - make an inventory of existing detectors
  - set DP priorities to acquire new detectors
  - realize future needs for detector development
  - understand what expertise and detector related information is needed
- Inventory priorities

  Detector usage:
  - Rely
  - Borrow
  - Backup

Questionnaire Results

Name	Charact	Beamlines priorities															DPinvntPrior
PIN								1				1				1	3
Streak camera																	0
APD				3	2					2		1	2				10
NaJ								1		1				2			4
NaJ							1					1				1	3
Ion chmb. Split-elctr.					2					2						1	5
Ion chamber							1	1	3			1					6
Single element EDD	Si PIN	3								2	2			1	1	1	10
Single element EDD	Si SDD				2										1	1	4
Single element EDD	Si SDD						1			1							2
Single element EDD	Si																0
Single element EDD	Ge				1	1	2		1		1	2				1	9
Single element EDD	SDD			3	2		2		2			2					11
Multi-3element EDD	Ge																0
Multi-element EDD	Si SDD			3			2		2								7
Multi-element EDD	Ge																0
Multi-element EDD	Ge	3					2		2			2	1	1		1	12
Wavelength spectr.	cryst.	3															3
Etc.																	0
Room tempr. CCD						1		2		1							4
objectives																	0
sci. crystals																	0
Peltie cooled CCDs				3				2						2			7
Advanced CCD			3				2			2							7
Advanced CCD					2			2				2					6
Wire																	0
Super CCD			3		2			2		2				2		1	12
Super CCD													1		1		2
Super CCD																	0
Image plate																	0
Image plate													1	2			3
Etc. Area																	0
Novel (cal., STJ)					2	2											4
Novel (pixel)																	0

Beamlines inventory

PIN								2		10	2	10		10	10	5	49
Streak camera			1								1						2
APD				3				10			2					1	16
NaJ	Cyberstar X1000							1	2	1	1						5
NaJ	Bicron				2		2		1	6	4	4	4	2	2	5	32
Ion chmb. Split-elctr.																	0
Ion chamber					3	3	2	2	6	6	10	4	20	8	5	5	74
Single element EDD	Amptek				1			2	1	1			2	2	3	1	13
Single element EDD	KETEK																0
Single element EDD	RONTEC																0
Single element EDD	Canberra Si						1		1				2	1			5
Single element EDD	Canberra Ge			1	1				2	1	1	1	3	2	1	1	14
Single element EDD	Phot. Imag.																0
Multi-3element EDD	Canberra					1							1				2
Multi-element EDD	KETEK															1	1
Multi-element EDD	PGT															1	1
Multi-element EDD	Canberra				1								2	2			5
Wavelength spectr.													1			1	2
Etc. Count.													4	2			6
Room tempr. CCD					2			2		2	1			10			17
objectives																	0
sci. crystals																	0
Peltie cooled CCDs			1		2		3						1	7			14
Advanced CCD	img			2			1	1								1	5
Advanced CCD	diff				1							1					2
Wire																1	1
Super CCD	Bruker		1											2		1	4
Super CCD	MAR												1		1		2
Super CCD	Other									1			1		4		6
Image plate																	0
Image plate			1							1			1	1	1	1	6
Etc. Area																	0
Novel (cal., STJ)																	0
Novel (pixel)																	0

Proposed Detector Pool inventory

DP 2003 budget = $650,000

DP 2003						
Item	**Project**	**Vendor**	**Model**	**Qty**	**$K (each)**	**subtotal**
Area Detectors						**Area**
M&S Area	Objectives, mounts, misc, etcÉ			1	$50	$50
1x1K pixel High-res camera	High res imaging (tomography, microscopy, etcÉ)	Roper Scientific	CoolSnap HQ	2	$18	$36
2x2K pixel High-res camera	High res imaging (tomography, microscopy, etcÉ)	Roper Scientific	VersArray 2048B	1	$50	$50
1x1K pixel FO System	Diffraction, High Energy X-Ray imaging	Roper Scientific	SCX 1300B FO 1:1	1	$110	$110
2x2K pixel FO System	Diffraction, High Energy X-Ray imaging	Roper Scientific	SCX 2048 FO 3:1	1	$140	$140
Counting Detectors						**Count.**
M&S Count.	Lab., cabling, hard/software support, misc., etcÉ			1	$30	$30
Ion chambers	Current			6	$5	$30
Bicron/Oxford	Counting	Bicron/Oxford		2	$10	$20
SDD 10 mm^2	Energy dispersive, Fluorescence	KETEK	AXAS-SDD10-145500	2	$10	$20
SDD 50 mm^2	Energy dispersive, Fluorescence	Phot. Img.	Vortex	2	$32	$64
Ge 100 mm^2	Energy dispersive, Fluorescence	Canberra		2	$15	$30
Photodiodes (PIN, APD)		IRD, Hamamatsu		20	$1	$20
Electronics (NIM)				10	$5	$50
Service contracts				0	$0	$0

Developments

APD package						0			3				3	3	3	3	15
PIN package														3	3	0	6
DSP														0	3	1	4
Integration into BL					3										2		5
DXP time functions																3	3
CCD acqusition														2		1	3
Fast CCD readout										3			2	1	3	3	12
Multi-elm. SDD				3	3	3			3								12
EDD 20eV / 100mm2					3												3
Objctv/sci.cr/mount					3								1	1			5
Img. Sub-um					2												2
BPM					2								3				5

- In-house
  - DP-ASD-AOD-CATs collaboration on detectors, electronics and software development
  - bring developments from other facilities
- DetectorSync
- DOE BES SBIR