

Title	<i>SR portable detector upgrade</i>			
Project Requestor	Bingxin Yang			
Date	02/28/2008			
Group Leader(s)	Glenn Decker			
Machine Manager	Louis Emery			
Category	Beam stability			
Content ID*	APS_XXXXXX	Rev.	ICMS_Revision	ICMS Document Date

*This row is filled in automatically on check in to ICMS. See Note ¹

Description:

Start Year (FY)	2009	Duration (Yr)	3
------------------------	-------------	----------------------	----------

Objectives:

Upgrade the portable detector for additional capabilities: (1) Absolute photon flux measurement using NIST-calibrated x-ray photo diodes. (2) Beam motion measurement from 0.01 Hz – 10 kHz or better. (3) Beam size measurement at 1 kHz or better. (4) EPICS support to make these values available to machine physicists, thus enable combined beam stability study from e-beam to user beamline output.

Benefit:

A standard detector with known computer interface to the machine control network will make it possible to develop software tools to track down instability problems at every beamline and identify whether the beam motion is from electron beam or from x-ray optics, whether it is local or widespread. In addition, a standard absolute detector capable of measuring every APS beamline will make comparison of the APS beamlines straightforward and will easily reveal problems if existed.

Risks of Project: See Note ²

None. The system will be used in place of user experiment / detector.

Consequences of Not Doing Project: See Note ³

Lack of a standard detector for the machine physicist to characterize beam motion at the output end of beamlines makes it difficult to quantify the effect of electron beam dynamics at the end of user beamlines.

Cost/Benefit Analysis: See Note ⁴

Silicon photo diodes are recommended by NIST as transfer standards in the x-ray region. Their low cost and ruggedness make them ideal for beamline application. Beam position monitor based on PIN diodes are widely used in the APS beam lines and will also be used for this project.

Description:

- This project includes four parts:
- (1) An absolute flux detector will be based on silicon photodiode which will be sent to NIST for calibration periodically.
 - (2) A beam position monitor using PIN diodes based on the APS design, with electronic recorders to allow position measurements up to 10 kHz or better.
 - (3) Fast imaging camera based on digital cameras to acquire beam sizes at a frequency of 1 kHz or better.
 - (4) A sturdy mechanical support that is compatible with the beam position / size resolution requirement.

Funding Details

Cost: (\$K)

Use FY08 dollars.

Year	AIP	Contingency
1	55	10%
2	55	10%
3	55	10%
4		
5		
6		
7		
8		
9		
Total	165	17

Contingency may be in dollars or percent. Enter figure for total project contingency.

Effort: (FTE)

The effort portion need not be filled out in detail by March 28

APS Strategic Planning Proposal

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc	Total
1	0.15		0.16	0.2	0.3			0.81
2	0.1		0.16	0.2	0.2			0.66
3	0.1		0.16	0.15	0.2			0.61
4								0
5								0
6								0
7								0
8								0
9								0

¹ **Notes:**

ICMS. Check in first revision to ICMS as a *New Check In*. Subsequent revisions should be checked in as revisions to that document i.e. *Check Out* the previous version and *Check In* the new version. Be sure to complete the *Document Date* field on the check in screen.

² **Risk Assessment.** Advise of the potential impact to the facility or operations that may result as a consequence of performing the proposed activity. Example: If the proposed project is undertaken then other systems impacted by the work include ... (If no assessment is appropriate then enter NA.)

³ **Consequence Assessment.** Advise of the potential consequences to the facility or to operations if the proposal is not executed. Example: If the proposed project is not undertaken then ____ may happen to the facility. (If no assessment is appropriate then enter NA.)

⁴ **Cost Benefit Analysis.** Describe cost efficiencies or value of the risk mitigated by the expenditure.

Example: Failure to complete this maintenance project will result in increased total costs to the APS for emergency repairs and this investment of ____ will also result in improved reliability of _____. (If no assessment is appropriate then enter NA.)