Title	***Storage Ring Beam Loss Position Monitor***			
Project Requestor	Jeffrey C. Dooling			
Date	September 19, 2008			
Group Leader(s)	M. Borland and G. Decker			
Machine or Sector Manager	Louis Emery			
Category	Accelerator Hardware and ID Improvements			
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)**	**4**

Objectives:

The purpose of this initiative is to develop a Beam Loss Position Monitor (BLPM) that provides spatial information of primary beam loss. This would be particularly aimed at understanding beam loss in the undulator straight sections.

Benefit:

The BLPM will allow us to quantify beam loss distributions in various operating modes, validating computer simulations, and leading to greater protection of undulator magnets that are damaged by radiation initiated by primary electrons.

Risks of Project: See Note [2]

Low.

Consequences of Not Doing Project: See Note [3]

Reduced undulator magnet lifetime, reduced undulator performance, additional costs reseting or replacing magnets, and overall accelerator reliability degradation through loss of equipment such as encoders and other radiation-sensitive components.

Cost/Benefit Analysis: See Note [4]

Many of the components are of significant cost, but have significant benefit. Hence, cost/benefit is favorable.

Description:

A four-sensor BLPM proto-type has been built and tested in SR Sector 9. The BLPM consists of an array of fiber optic (FO) cables where Cerenkov radiation from lost beam electrons is generated and directed to a bank of shielded photo-multiplier tubes. In the present arrangement, FO sensors are placed in close proximity to the beam pipe with the length of the fiber running parallel to the beam. Each FO cable sensor is composed of 61 200-micron DIA, fused-silica fibers in a close-packed array forming an aperture of approximately 2 mm DIA. The proto-type BLPM allows for an array of 6 FO sensors, 3 above and 3 below the beam pipe. The FO centers are spaced 1.27 cm apart. Currently, only four of the six slots are filled—3 above and 1 below in a "T" pattern. The middle FO sensors are aligned horizontally with the beam centerline. The FO length along the vacuum chamber can be adjusted to match the environment; in the present configuration it is 30 cm. The BLPM can provide both fast time resolution of particles lost from the beam for dynamic behavior studies, as well as integrated signals for dosimetry purposes. The BLPM allows investigation of beam loss intensity and position during a variety of operating modes, and allows a unique perspective of instability-induced loss.

The proposed system fits in well with Objective 3 of the SR beam loss monitor upgrade proposal authored by B. Yang (APS_1255147).

Funding Details

Cost ($K). Contingency may be in dollars or percent. Enter figure for total contingency.

Year	AIP	Contingency
1	60	9
2	60	9
3	50	4.5
4	30	4.5
5		
6		
7		
8		
9		
Total	200	27

Effort (FTE).
The effort portion need not be filled out in detail by March 28.

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc	Total
1	0.1		0.1	0.1	0.1	0.1		0.5
2		0.1	0.1	0.1	0.1	0.1		0.5
3			0.1	0.05	0.2			0.35
4			0.1		0.2			0.3
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. C*heck Out* the previous version and C*heck 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.)