

<b>Title</b>	<b><i>PAR BPM Upgrade</i></b>			
Project Requestor	Michael Borland			
Date	March 21, 2008			
Group Leader(s)	Arnold, Borland, Decker			
Machine or Sector Manager	CY Yao			
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 <sup>1</sup>

**Description:**

<b>Start Year (FY)</b>	<b>2009</b>	<b>Duration (Yr)</b>	<b>3</b>
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**Objectives:**

The purpose of this proposal is to improve the reliability, stability, and flexibility of PAR operation. This will be done by upgrading the existing BPM system.

**Benefit:**

More consistent delivery of bunches to the booster, particularly during top-up operation. Fewer operational issues that interfere with top-up.

**Risks of Project:** See Note <sup>2</sup>

Low.

**Consequences of Not Doing Project:** See Note <sup>3</sup>

Continued occasional operations issues that interfere with top-up and make system tuning difficult. Charge dependence of existing PAR bpm system makes orbit correction unusable at low and high charge.

**Cost/Benefit Analysis:** See Note <sup>4</sup>

Many of the components are moderate in cost and have significant benefit. Diag Group has built FPGA-based system for the storage ring and beam transport line. The design can

be directly applied to the PAR with only minor change. Hence, cost/benefit is favorable.

**Description:**

This proposal is discussed in the context of a general PAR improvement initiative in Section 4 of OAG-TN-2008-008.

The current PAR BPMs have a slow acquisition cycle that uses multiplexing to read all the BPMs in sequence. We propose to upgrade this with a faster system based on modern electronics and FPGA technology. The purpose is to get reliable simultaneous BPM readings over a large range of beam charge, including turn-by-turn data. This will provide reliable orbit monitoring and control, as well as improved diagnostics in the event of operational difficulty. It will also provide a system that is ready-made for fast feedback, should that be found helpful in operating the PAR more reliably or extreme high beam charge is required for special operation mode of the storage ring.

**Funding Details**

**Cost: (\$K)**

Use FY08 dollars.

Year	AIP	Contingency
1	50000	
2	50000	
3	11000	
4		
5		
6		
7		
8		
9		
Total	111000	

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		0.2	0.05	0.2	0.3			0.75
2		0.1	0.1	0.2	0.2			0.6
3		0.1	0.05	0.1	0.2			0.45
4								0
5								0
6								0
7								0
8								0
9								0

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<sup>1</sup> **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.

<sup>2</sup> **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.)

<sup>3</sup> **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.)

<sup>4</sup> **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.)