

Title	<i>Storage Ring Real-time Feedback Upgrade</i>		
Project Requestor	Frank Lenkszus		
Date	March 24, 2008		
Group Leader(s)	Glenn Decker		
Machine or Sector Manager	Louis Emery		
Category	Beam Stability		
Content ID*	APS_1255207	Rev.	2
			3/28/08 12:00 AM

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

Description:

Start Year (FY)	FY08	Duration (Yr)	4
------------------------	-------------	----------------------	----------

Objectives:

Increase sampling rate of the APS storage ring real-time orbit feedback system from 1.5 kHz to 20 kHz; include capability to perform fast rf system phase adjustments / feedback.

Benefit:

This upgrade will extend the closed-loop bandwidth (the frequency span where beam motion is substantially reduced) from the present DC-50 Hz up to DC-200 Hz, where significant residual beam motion exists. In addition, the damping of synchrotron oscillations near the 2 kHz synchrotron frequency will be supported.

Risks of Project: See Note ²

This effort must be closely coordinated with parallel upgrades to the storage ring power supplies and the monopulse rf beam position monitors if the desired performance is to be achieved.

Consequences of Not Doing Project: See Note ³

Long-term AC stability goals will not be met; performance will continue to lag behind other third-generation light sources.

Cost/Benefit Analysis: See Note ⁴

The clear benefit to this effort will be more satisfied users moving forward. More sophisticated experiments relying upon better AC beam stability will be made possible. This will include improved timing stability by implementing rf system phase control feedback.

Description:

The scope this project includes the following elements:

- 1) Upgrade digitizers for narrowband rf and x-ray bpm's to significantly faster units (see project proposal 532-06, not funded to date)
- 2) Add two additional reflective memory data networks to the existing system
- 3) Procure new digital signal processors to handle higher data throughput, up to 8 beam position monitors and 2 correctors per sector per plane vs. the present 4 bpm's and single corrector. (see project proposal 455-06, not funded to date).
- 4) Ancilliary interface hardware required for seamless interface to the new power supplies and monopulse bpm system.
- 5) Design, fabrication, installation and commisioning of phase feedback control cards to interface the real-time orbit feedback system with the low-level rf cavity phase control loops.

Funding Details

Cost: (\$K)

Use FY08 dollars.

Year	AIP	Contingency
1	110	10
2	245	20
3	245	20
4		
5		
6		
7		
8		
9		
Total	600	50

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		0.4		0.4	0.2			1
2		0.5		0.3	0.5			1.3
3		0.3		0.5	0.3			1.1
4		0.1		0.3	0.1			0.5
5								0
6								0
7								0
8								0
9								0

Notes:

¹ **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.)