Title	***Solid-State RF Amplifier Development***			
Project Requestor	Dave Bromberek			
Date	4/16/08			
Group Leader(s)	Ali Nassiri			
Machine or Sector Manager	Louis Emery			
Category	Obsolescence/Spares			
Content ID*	APS_1256746	Rev.	1	

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

Description:

Start Year (FY)	**2009**	**Duration (Yr)**	**2**

Objectives:

Develop a 100kW solid-state rf amplifier at 350MHz. This amplifier would be a building block for the replacement of current 350MHz rf system vacuum tube topology.

Benefit:

High power 352 MHz/1 MW CW klystrons are the heart of the APS booster and storage ring high power rf systems. In recent years the cost of these high power rf transmitters has tripled. It is also troubling that only one manufacturer can currently supply these to the APS. Limited market and demand of such devices worldwide could potentially force the manufacturer to cease production or repair/refurbishment. In addition, these rf sources have inherited instabilities issues that are unpredictable and require special care to minimize their contribution to the machine faults and rf downtime. It is crucial to the APS operation that we start exploring alternative technology for production of high power rf now. Recent success at the SOLEIL light source, utilizing high power solid-state technology for rf amplifier is very encouraging to us. ESRF is also proposing utilizing solid-state rf amplifier approach as part of their rf system upgrade program. We propose to investigate this option as a potential replacement for the APS 352 MHz/1 MW klystrons.

Risks of Project: See Note [2]

N/A

Consequences of Not Doing Project: See Note [3]

Failure to undertake this project will result in continued reliance on vacuum tube technology, provided by a single supplier, which could possibly be dropped from the vendor product line.

Cost/Benefit Analysis: See Note [4]

Provides a state-of-the-art building block as a possible replacement of the current 350MHz klystron-based rf systems.

Description:

Design and build a 100kW rf amplifier at 350MHz using solid-state technology. Knowledge and experience gained with solid-state amplifiers is crucial to keeping the APS operational and at the forefront of accelerator technology.

Funding Details

Cost: ($K)
Use FY08 dollars.

Year	AIP	Contingency
1	200	40
2	400	80
3	400	80
4		
5		
6		
7		
8		
9		
Total	1000	200

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

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc	Total
1		0.5			0.2	0.2		0.9
2		0.5		0.3	0.5	0.2		1.5
3		0.2		0.3	0.5	0.1		1.1
4								0
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. 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.)