

**Report from WP7: ICTF**

# TIARA WP7: milestones and deliverables:

Milestone number <sup>59</sup>	Milestone name	Lead beneficiary number	Delivery date from Annex I <sup>60</sup>	Comments
MS27	RFSysReq	9	8	Report on RF system layout and requirements
MS28	SymDiac	2	19	Simulation of Diacrode complete

Deliverable Number <sup>61</sup>	Deliverable Title	Lead beneficiary number	Estimated indicative person-months	Nature <sup>62</sup>	Dissemination level <sup>63</sup>	Delivery date <sup>64</sup>
D7.1	RFSysV-Spec	9	10.00	R	PU	15
D7.2	RFamp1-Test	9	17.00	R	PU	33
D7.3	RFSysVI-Spec	9	8.50	R	PU	36
D7.4	RF_Ampl-DR	2	12.00	R	PU	36

## Description of deliverables

D7.1) RFSysV-Spec: Report on the design and specification of ICTF RF power distribution system for MICE Step V [month 15]

D7.2) RFamp1-Test: Report on commissioning of the first RF amplifier system in the ICTF Hall. [month 33]

D7.3) RFSysVI-Spec: Report on the design and specification of ICTF RF power distribution system for MICE Step VI (full ICTF implementation) [month 36]

D7.4) RF\_Ampl-DR: Design report of a 3 MW power amplifier [month 36]

## Contents:

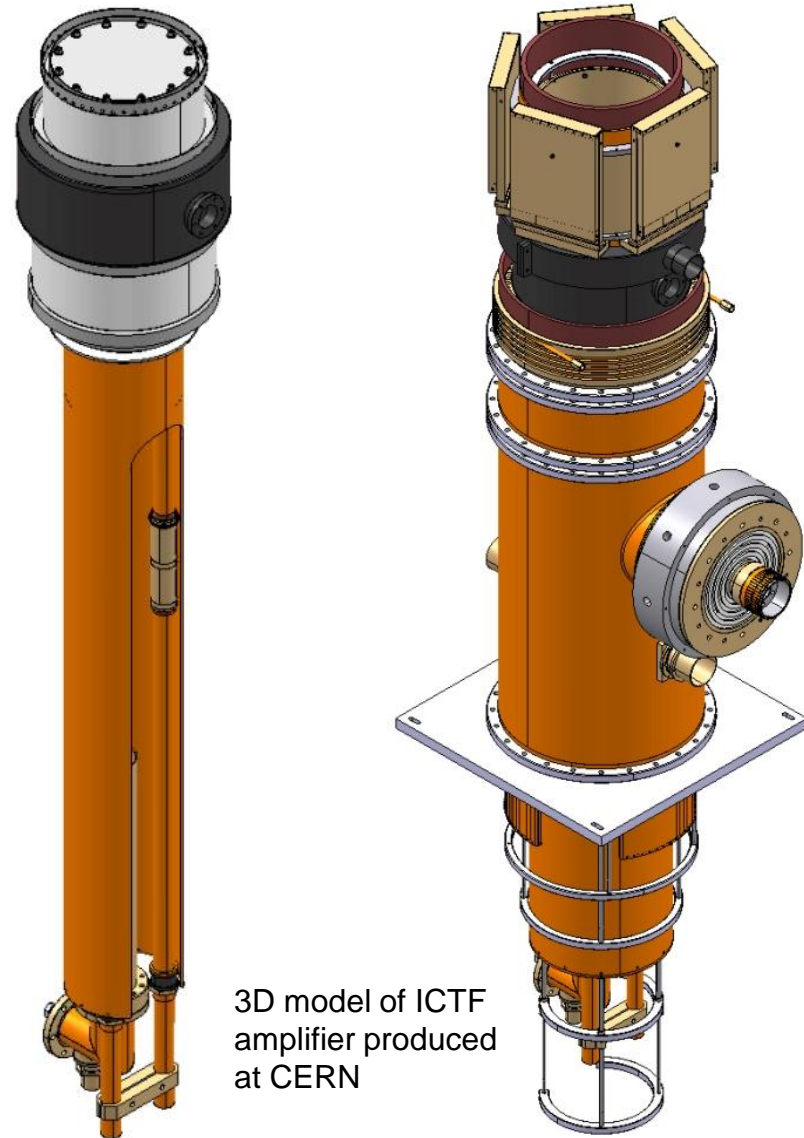
- **A. Moss' excellent talk summarised status of WP7, so:**
- **Comment on Diacrode work**
- **Preparation for MICE Step IV and consideration of build-up of first amplifier in the MICE Hall**

**WP7: Ionization cooling test facility:**

**Novel Pulsed RF Power Amplifier Design**

## *task 7.2 : Novel pulsed RF power amplifier design*

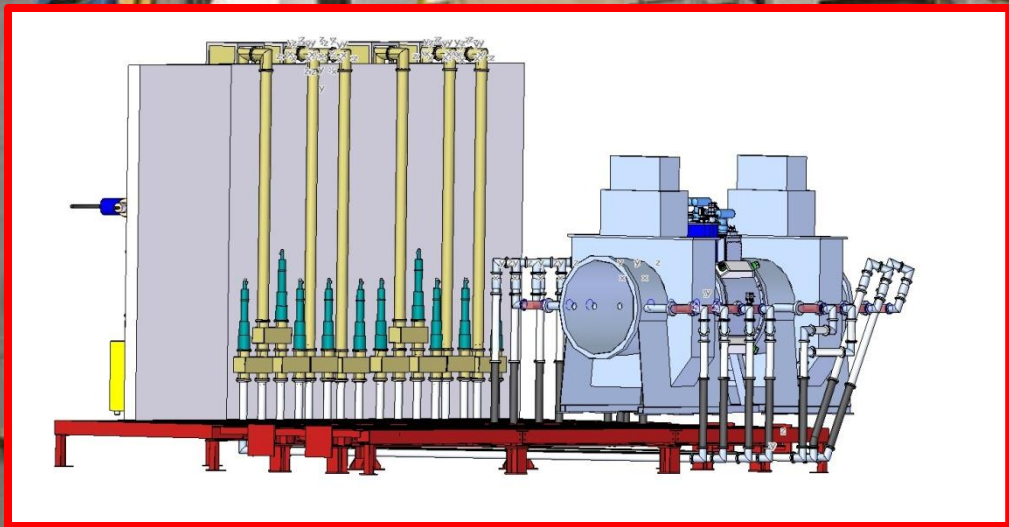
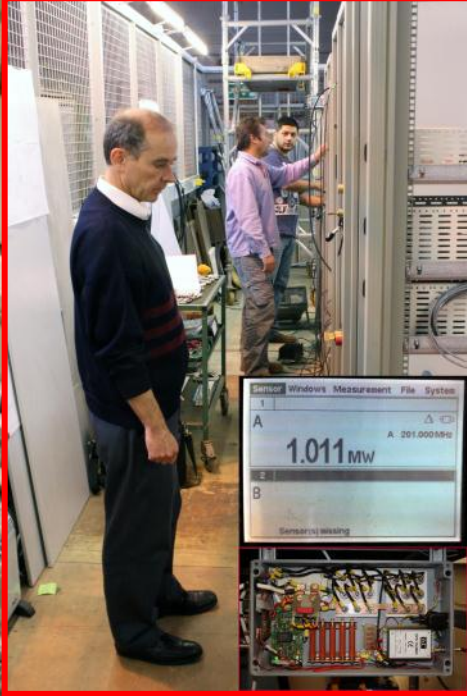
- Work has started on a review of the state of development of diacrode systems in the international community.
  - One goal of this review is to identify designs or recommendations of “best practice” that can be incorporated into the design that will be developed.
  - In particular, contact has been made with Los Alamos where diacrode tests are in progress.
  - Taking into account the results of these tests will be important in the development of the amplifier design for the ICTF.
  - A visit to Los Alamos facilities took place in March 2012 where the diacrode was seen operating at 3.1MW
  - TIARA pulse conditions will be tried and expect to produce 3.5MW with report to follow
- First deliverable : Simulation of Diacrode complete, planned 31/5/12.
  - Drawings of the diacrode amplifier have been procured from THALES.
  - These drawings will be essential when the design work on the ICTF amplifier starts in earnest.
  - The space constraints of the application in the ICTF Hall will require special consideration.



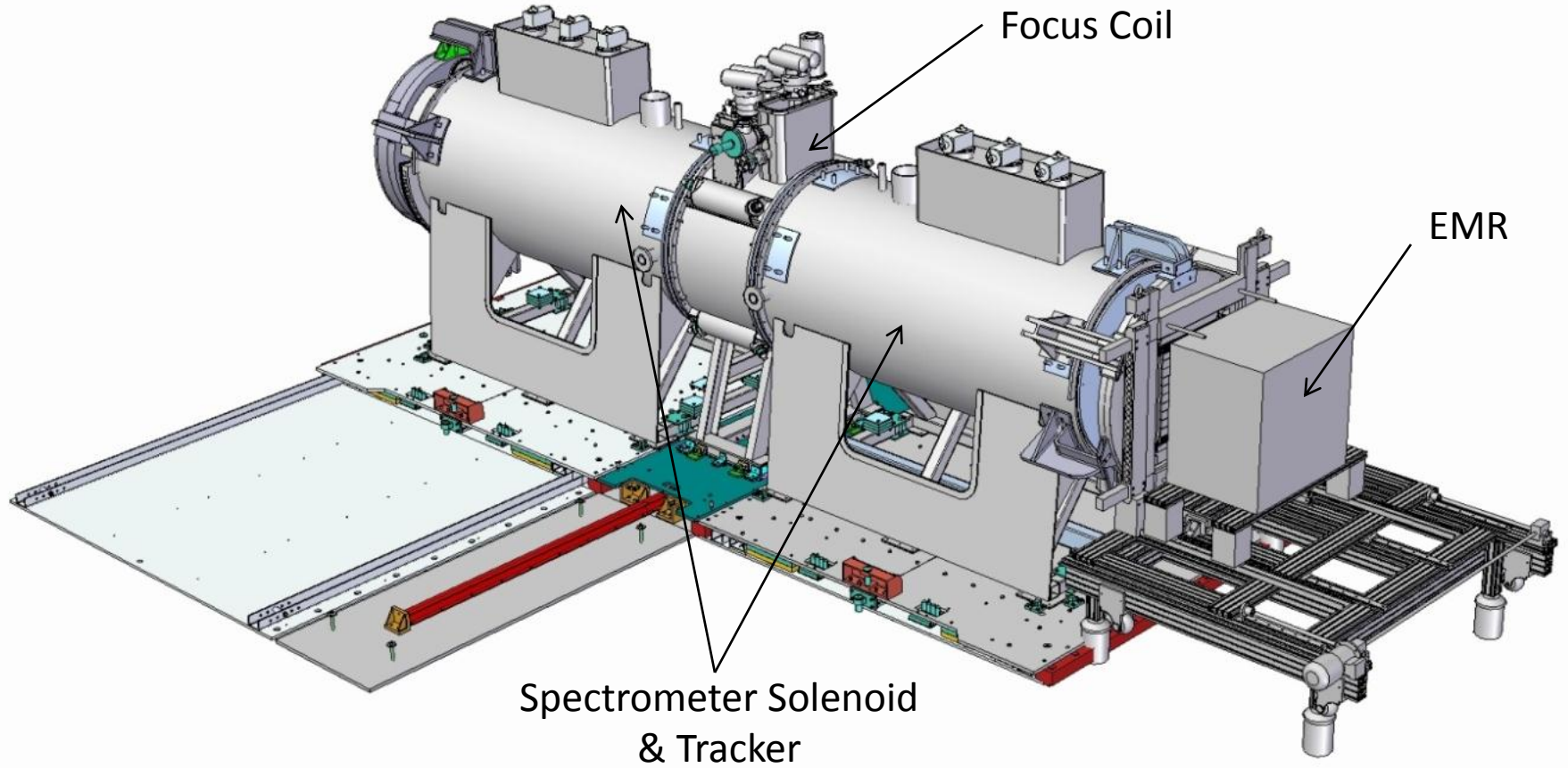
3D model of ICTF amplifier produced at CERN

**WP7: Ionization cooling test facility:**

**Introduction to MICE**

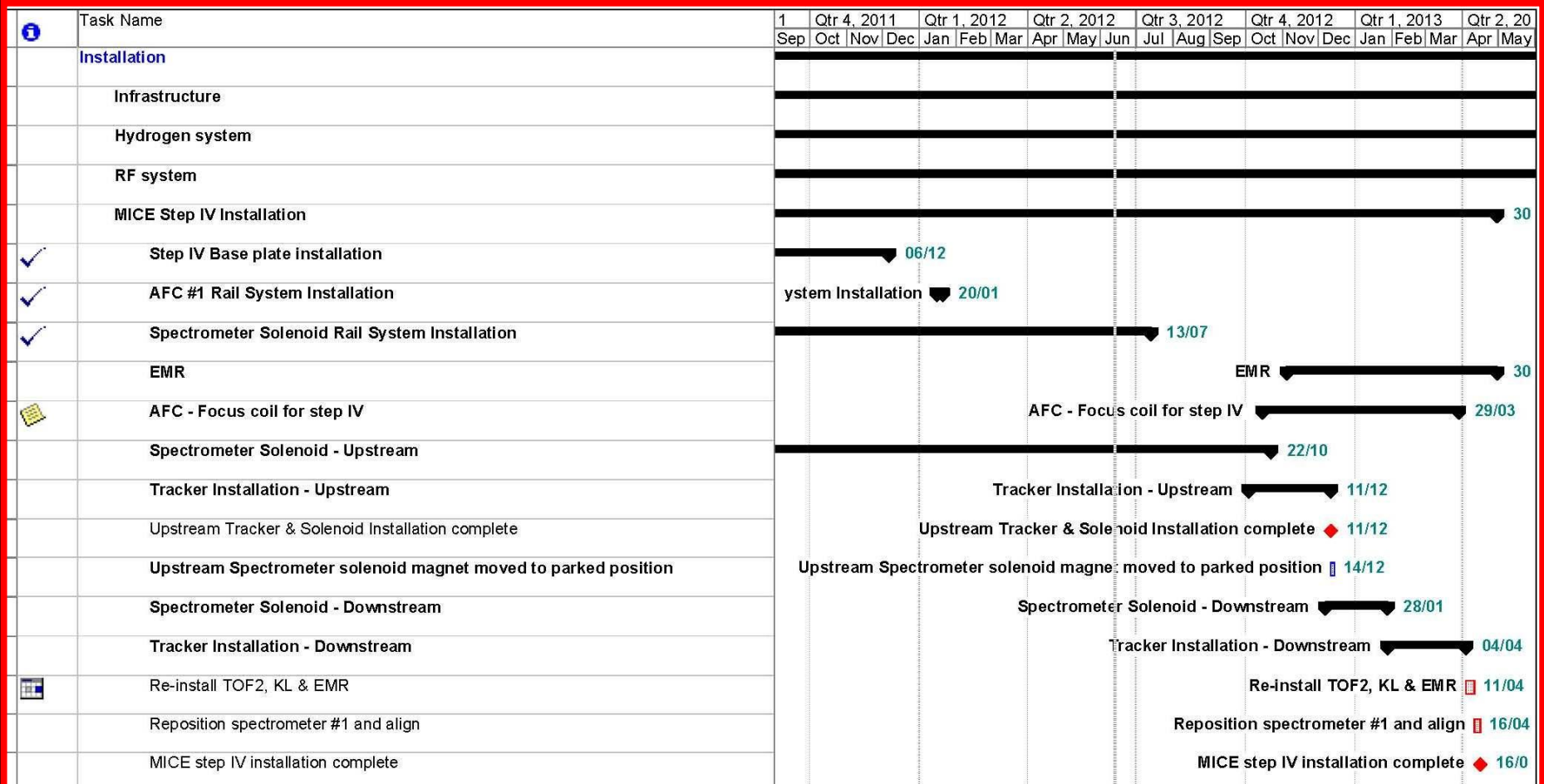


# Step IV

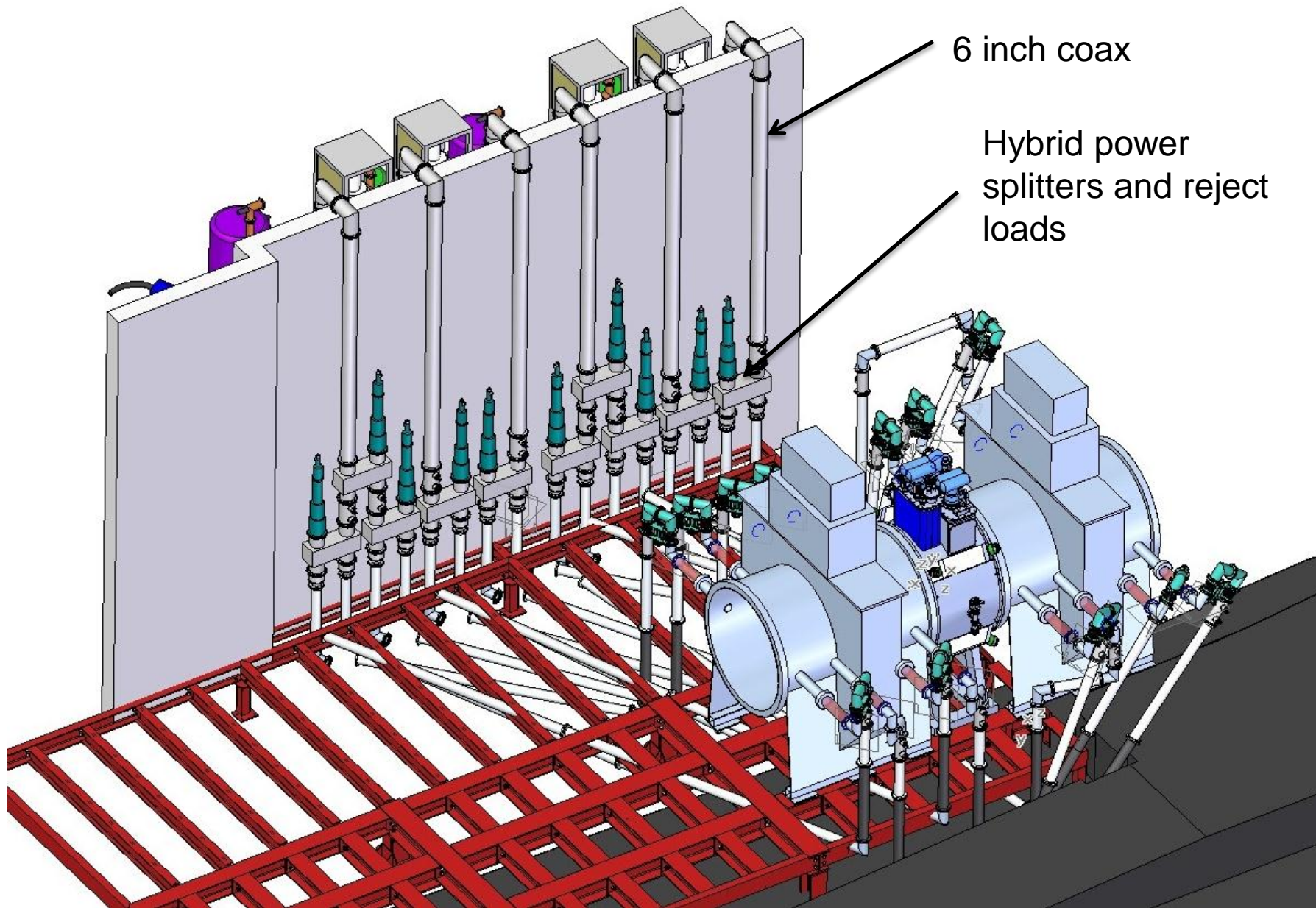




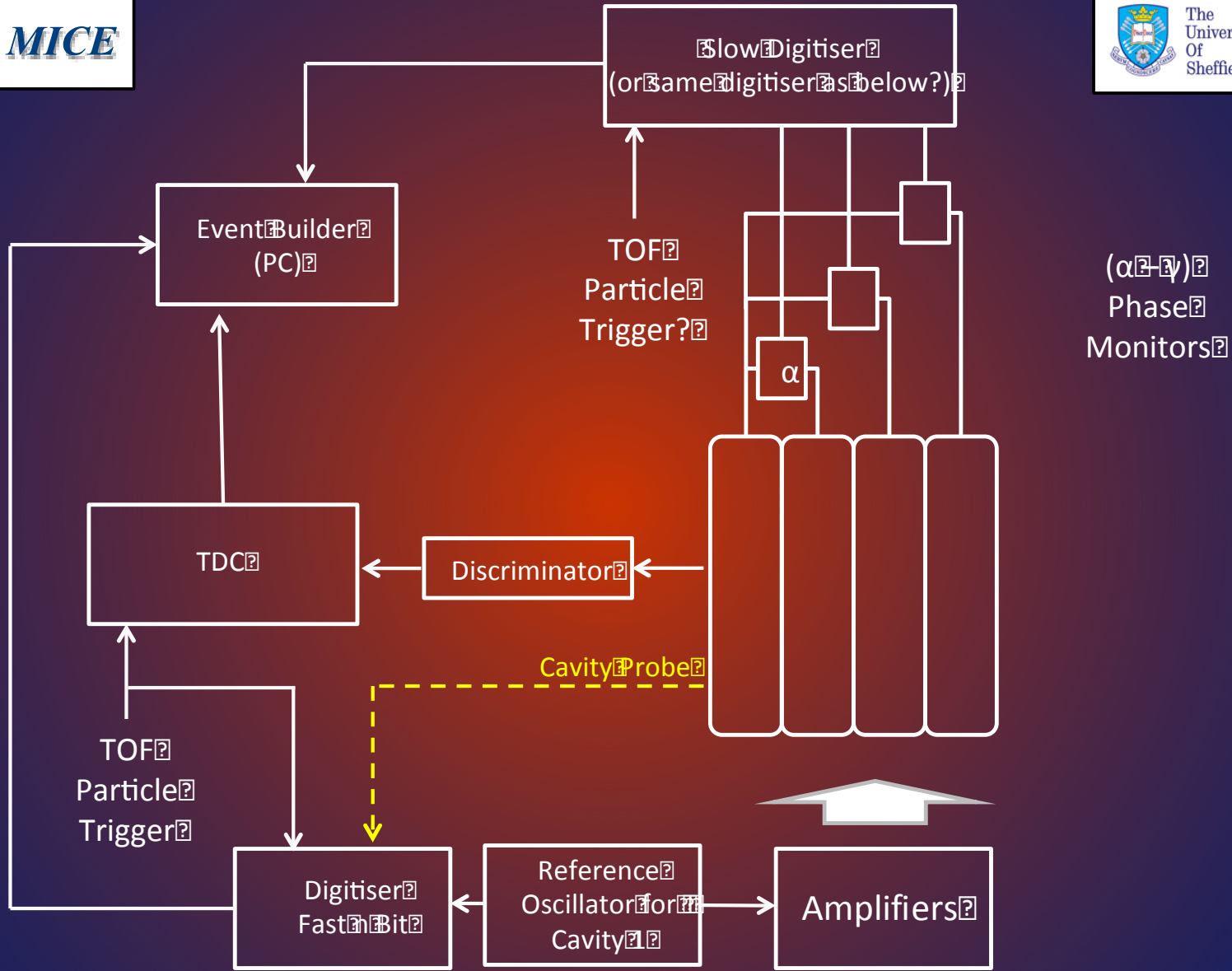
# Step IV planning (draft!):



- From spring 2013, MICE will enter extended running phase
- Installation of first amplifier scheduled to be completed by autumn 2013
  - Requires that installation be interleaved with running



# Instrumentation, monitoring and DAQ:

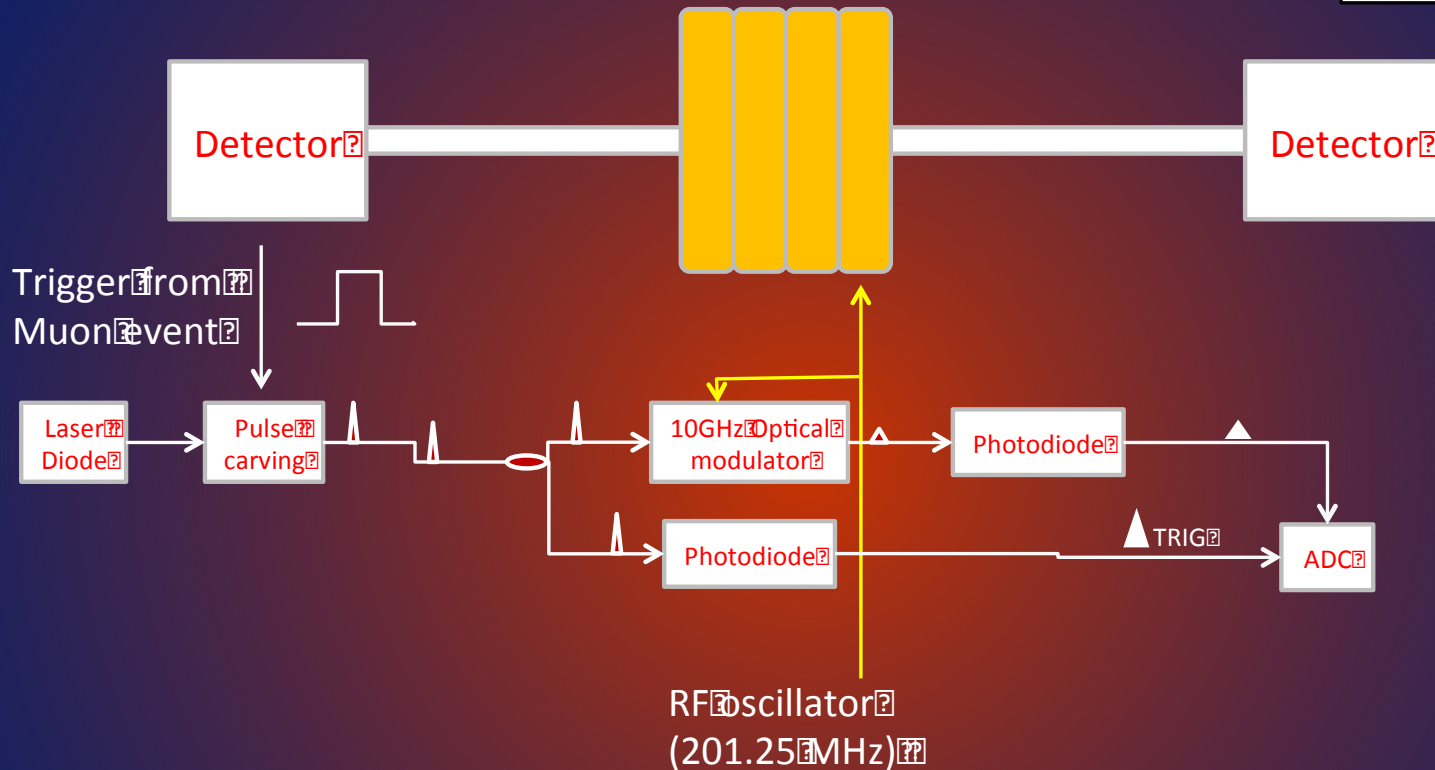


$(\alpha - \beta)$   
Phase Monitors

# Option for phase and amplitude:



## OPTICAL TIMING - Phase information



- Optical pulses are carved by the event triggers.
- Pulse pairs split to generate an ADC trigger and probe pulse
- Probe pulse amplitude modulated by the RF oscillator to determine timing with respect to RF phase.
- Pulse amplitude sampled with ADC
- Expected jitter  $\approx 1.0$  ps (assuming no trigger-RF oscillator jitter)

# Planning:

Milestone No	RF@Alan@Grant	19/08/11	31/08/11	05/01/12	01/04/12	Comments
		Baseline Completion Date	Revised Completion Date	Revised Completion Date	Revised Completion Date	
<b>Installation</b>						
23	RF@Control@Rack@1@Complete	26/07/12	26/07/12	26/07/12		
25	RF@System@1@Integration@Starts	07/02/11	07/02/11			Complete
26	System@1@616@Racks@Ready	01/06/11	29/05/12	21/06/12		
27	4616@Amplifier@Electrical@Complete	26/07/12	26/07/12	28/08/12		
28	System@1@H116@Racks@Ready	06/09/12	06/09/12	01/10/12		
29	RF@System@2@Integration@Starts	21/05/13	21/05/13	21/05/13		
30	System@2@616@Racks@Ready	02/07/13	02/07/13	02/07/13		
31	System@2@H116@Racks@Ready	20/09/13	20/09/13	20/09/13		
32	RF@System@3@Integration@Starts	19/11/13	19/11/13	19/11/13		
33	System@3@616@Racks@Ready	31/12/13	31/12/13	31/12/13		
34	System@3@H116@Racks@Ready	21/03/14	21/03/14	21/03/14		
35	RF@System@4@Integration@Starts	01/05/14	01/05/14	01/05/14		
36	System@4@616@Racks@Ready	12/06/14	12/06/14	12/06/14		
37	System@4@H116@Racks@Ready	02/09/14	02/09/14	02/09/14		
<b>TIARA@MILESTONES</b>						
<b>7.1:RFP:CTF@RF@power@infrastructure</b>						
M7.1:	Report@on@RF@system@layout@and@requirements	10/08/11	08/11/11			Milestone@Complete
D7.1:	Report@on@the@design@and@specification@of@CTF@RF@power@distribution@system@for@MICE@	16/03/12	16/03/12	16/03/12		Deliverable@Complete
D7.2:	Report@on@commissioning@of@the@first@RF@amplifier@system@in@the@CTF@Hall.	10/09/13	10/09/13	10/09/13		Deliverable
D7.3:	Report@on@the@design@and@specification@of@CTF@RF@power@distribution@system@for@MICE@	01/01/14	01/01/14	01/01/14		Deliverable
<b>7.2:NRFAmp:Novel@pulsed@RF@power@amplifier@design</b>						
M7.2:	M7.4@simulation@of@diacode@complete	31/05/12	31/05/12	31/05/12		Milestone@In@progress
D7.4:	Design@report@of@30@MW@power@amplifier	31/12/12	31/12/12	31/12/12		Deliverable

Completed	14/06/12
Milestone@late@passed	15/07/12
Less@than@30@days@away	
More@than@30@days@away	

## **WP7: Ionization cooling test facility:**

### **Conclusions**

# Conclusions:

- **MICE RF power:**
  - **Excellent progress on design and layout;**
  - **Steady progress on commissioning and refurbishment**
  - **Now beginning to plan installation and commissioning of first amplifier in the MICE Hall**
    - **Must be interleaved with MICE running;**
      - **Implies some care in planning**
        - » **Seek to advance preparations where possible**
- **Diacrode:**
  - **Benefit to TIARA of collaboration with Los Alamos will be that final report may include information from test of amplifier**