FP420 general milestones

A. Brandt, C. DaVia

Outline:

A lot of work ahead of us…

… but a lot of fun too!!!!

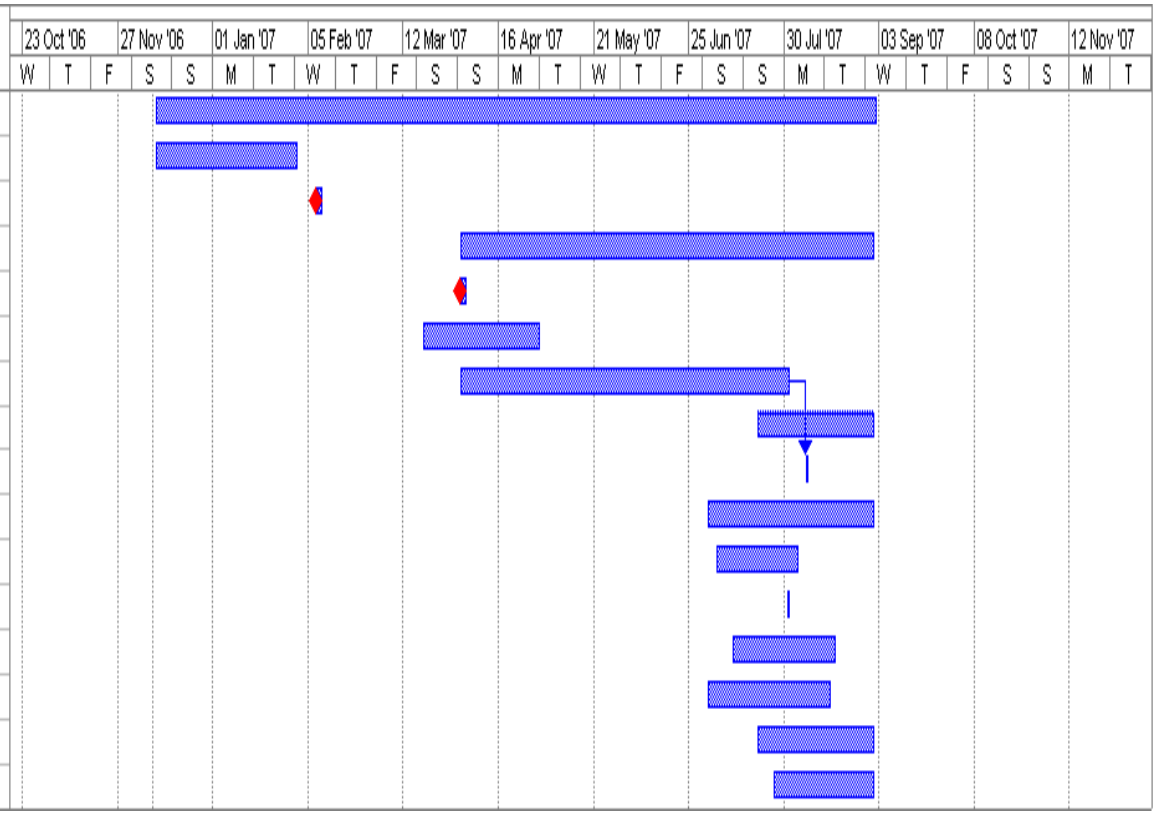
Work divided into two Phases:

Phase 1:

Objective: integrated test beam in August 2007

Milestones: Atlas and CMS proposals Jan/Feb 07
UK and others fund proposals March 07

ID	Task Name	Duration	Start	Finish	Predecessors
1	general FP420 milestones	190 days	Mon 11/12/06	Sat 01/09/07	
2	draft document	38 days	Mon 11/12/06	Wed 31/01/07	
3	meeting at CERN	2 days	Thu 08/02/07	Fri 09/02/07	
4	test beam preparation starts	110 days	Mon 02/04/07	Fri 31/08/07	
5	UTA collaboration meeting	2 days	Mon 02/04/07	Tue 03/04/07	
6	sensors processing	31 days	Mon 19/03/07	Mon 30/04/07	
7	boards assembly	87 days	Mon 02/04/07	Tue 31/07/07	
8	planes lab tests	31 days	Fri 20/07/07	Fri 31/08/07	
9	timing detectors at Cern	1 day	Tue 07/08/07	Tue 07/08/07	7
10	hamburg pipe at CERN	45 days	Mon 02/07/07	Fri 31/08/07	
11	positioning motors test	22 days	Thu 05/07/07	Fri 03/08/07	
12	vacuum	1 day	Tue 31/07/07	Tue 31/07/07	
13	alignment system test	28 days	Wed 11/07/07	Fri 17/08/07	
14	cooling	33 days	Mon 02/07/07	Wed 15/08/07	
15	HV and LV	31 days	Fri 20/07/07	Fri 31/08/07	
16	common DAQ	27 days	Thu 26/07/07	Fri 31/08/07	



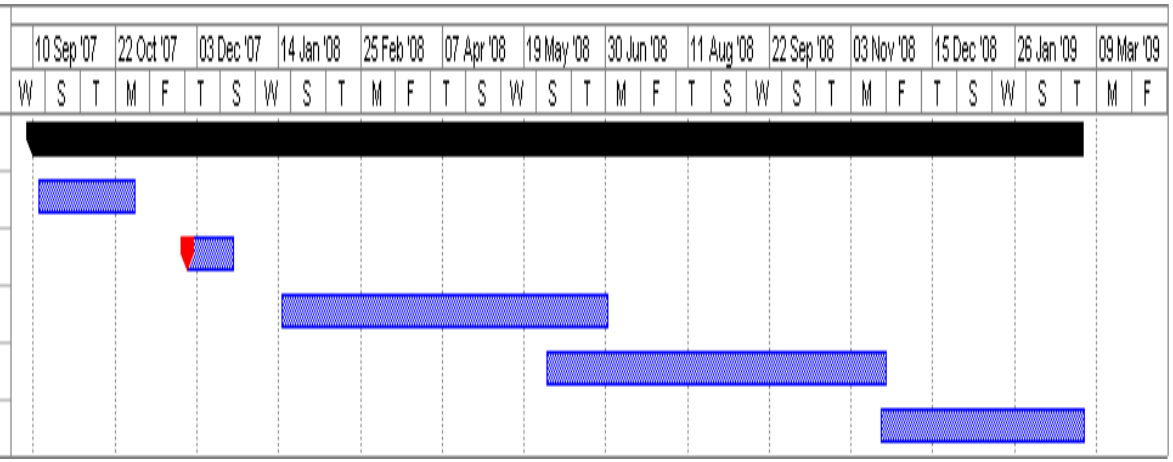
Phase 2: pre-production and installation

Services (cables, fibres, , cryostats, power supplies, cryogenics, motors) high priority,
Should be ready CERN in August.
Stations, timing detectors, daq can be installed till March 09

SOFTWARE, DAQ and Integration with the mother experiment needs to start NOW

FUNDS should be available by mid-end 07, should take into account Services
Costs (like cables and transport) and general consumables. COMMON FUND???

ID	Task Name	Duration	Start	Finish	Predecessors
1	phase 2 pre-production	385 days	Mon 10/09/07	Sun 01/03/09	
2	data analysis test beam	36 days	Wed 12/09/07	Wed 31/10/07	
3	design review and report	18 days	Wed 28/11/07	Fri 21/12/07	
4	pre-production	120 days	Tue 15/01/08	Mon 30/06/08	
5	delivery and assembly	125 days	Fri 30/05/08	Thu 20/11/08	
6	installation	75 days	Tue 18/11/08	Mon 02/03/09	



THE EXPERIMENTS PROPOSALS:

Example of ATLAS upgrade proposal:
~ 14 pages
Template available
Intro, Proposing Institutes
Topics and Goals of R&D proposal
RELATION TO EXISTING EFFORTS!!!

There should be something similar for CMS but I could not find it on the WEB

ATLAS project	Development, Testing, and Industrialization of 3D Active-Edge Silicon Radiation Sensors with Extreme Radiation Hardness: Results, Plans		
ATLAS Upgrade Document No:	Institute Document No.	Created: 17/07/2006	Page: 1 of 14
		Modified:	Rev. No.: 1.00

Abstract

We are fabricating 3D sensors with N and P electrodes perpendicular to, rather than in, the plane of the surfaces. This allows, for full length tracks, a small electrode pitch with short collection times, relatively low depletion voltages, and sensitivity to within a few microns of the physical edges. Previous measurements have shown the expected low depletion voltages and fast pulses, even from radiation damaged sensors, and measurements this year have shown radiation resistance up to 8.6 x 10^{15} 1 MeV equivalent neutrons (1.4 x 10^{14} high energy protons) per sq. cm, and pulse widths, set by the speed of the amplifier, of 5 ns full width at the base.

Current work includes: (1) further irradiation tests, (2) the development of yield-improving steps, (3) preparation for a beam test of sensors bonded to ATLAS pixel front end readout chips, and (4) work with a silicon sensor company that intends to develop 3D technology.

Future work will include a continuation of this program with the addition of (1) studies on radiation damage effects in the field oxide, (2) studies, both with high-energy beams with x-ray micro-beams, of the collection efficiency of ionization from within the electrodes, (3) additional sensor fabrication runs both for further tests, yield improvement, and electrode efficiency developments, and (4) the start of plans for the assembly of these sensors into pixel modules for a possible new b-layer.

Contact Person: Sherwood Parker (sher@slac.stanford.edu)

1 Introduction

The performance of the b-layer of the ATLAS pixel detector will begin to deteriorate after a dose of 10^{15} cm^{-2} 1 MeV neutron equivalent which it will receive in about 3 years at the LHC design luminosity, and a replacement might be needed by 2012 [1]. The even higher luminosities of a Super-LHC will require a new silicon pixel detector, with increased radiation hardness for all other layers as well. Compared with the present detector, it will need to have, (1) a reduced depletion voltage, (2) a reduced capture of charge carriers, (3) increased speed (also potentially useful if the crossing interval is reduced), and (4) a smaller charge sharing region to minimize further reduction of signal size. 3D sensors, in which the n and p electrodes are perpendicular to the surface and penetrate through the entire substrate, excel in all of these qualities [2 – 10]. In addition, it would be desirable to reduce the material in the tracking volume. One way would be to use the active-edge feature of 3D sensors, which brings sensitivity to within about a micron of the physical edges, to increase the present live fraction, which is only about 71% [1].

2 Participating Institutions

ATLAS groups participating are from the University of Hawaii, the University of New Mexico, and the Czech Technical University. Individuals from two other ATLAS groups – the Lawrence Berkeley National Laboratory, and the University of Bonn – are working with us, as are two electrical engineers from the CERN Microelectronics group, primarily on high speed readout circuits. A company that makes silicon detectors and is also a research institute with Norwegian government funding, SINTEF, is working with us to develop 3D manufacturing technology. At present C. Kenney (Molecular Biology Consortium) and Jasmine Hasi (Brunel University), working at the Stanford Nanofabrication Facility, make all of our sensors.

3 Topic(s) and goal(s) of the R&D proposal

The primary goal (PBS 4.1.1.1) is the development, fabrication, characterization, and testing, with and without the front-end readout chip, of 3D – active-edge silicon pixel sensors of extreme radiation hardness and high speed for the ATLAS b-layer replacement and the the SLHC ATLAS upgrade. A secondary goal is to start design work for a b-layer detector module using this sensor.

4 Relation to existing efforts (inside and outside of ATLAS).

Identical technology, 3D active-edge pixel sensors to be read out by the ATLAS front end chip, is planned for the CERN FP420 R & D program, and 3D active-edge / planar-central strip sensor will be

Mike prepared already a quite exhaustive document skeleton which could be used for the funding proposals.

November 14, 2006

FP420 TDR Skeleton*

Names of Authors†

Institutions

Abstract

One paragraph abstract. I like LaTeX and I think we should do it that way.
Note: I inserted one or two notes just as reminders, no attempt to put in contents!

Contents

For all documents: every project should provide break down milestones by the discussion session on Tuesday

- Could every speaker please provide:

-Their own project sub-Milestones of the two phases to the convener of their session (with the presentation)

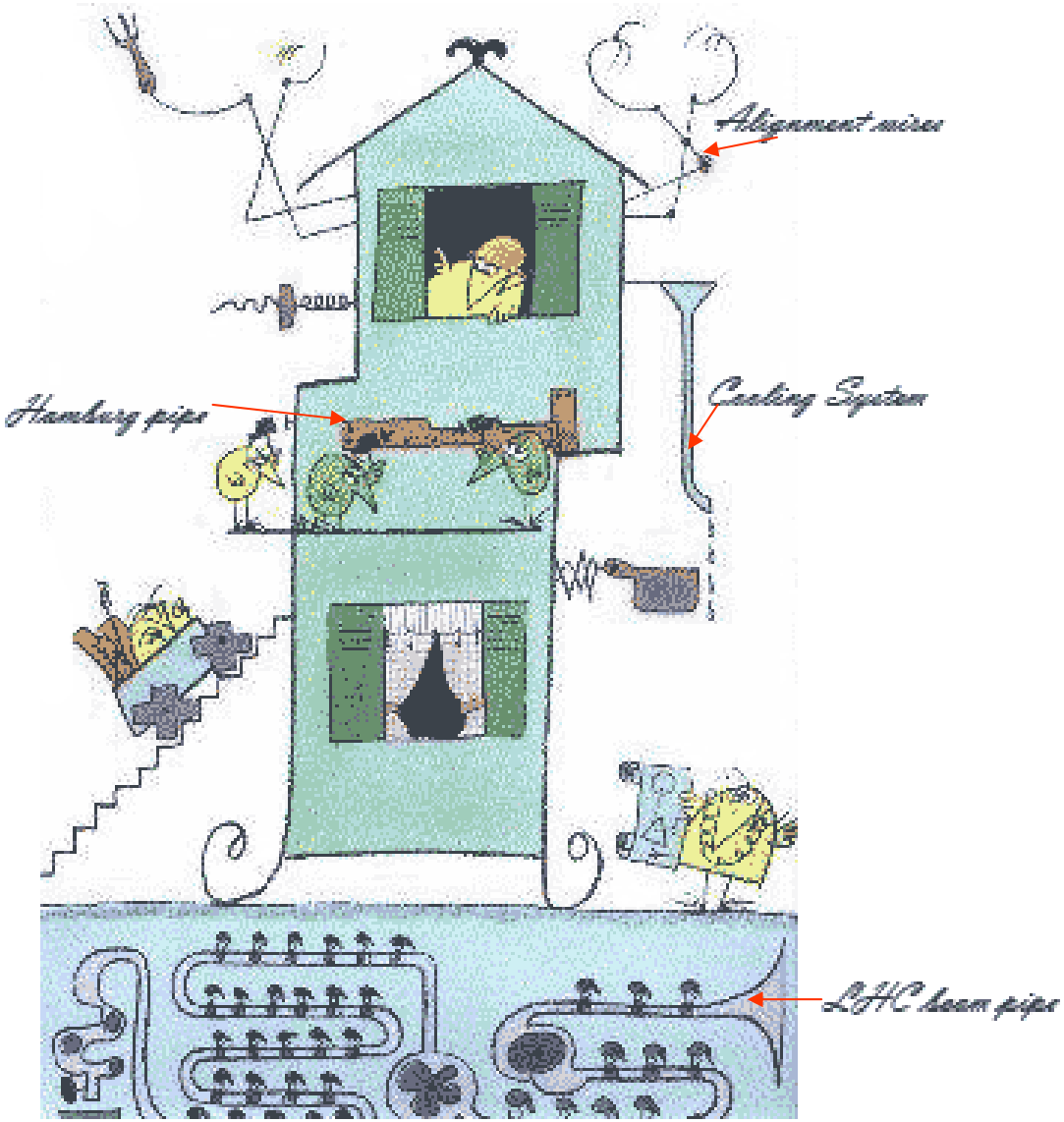
-Technical and schedule risk items

-A summary (1-2 pages) of their presentation (will be used for the proposal)

We will need everyone contribution as soon as possible.

Before Xmas would be fantastic!

FP420 Installation phase



Cinzia