SLHC Phase I & II Upgrades

Roma, March 16th, 2008

G. Darbo - INFN / Genova

Agenda Page:

ATLAS Upgrade Week - Highlights

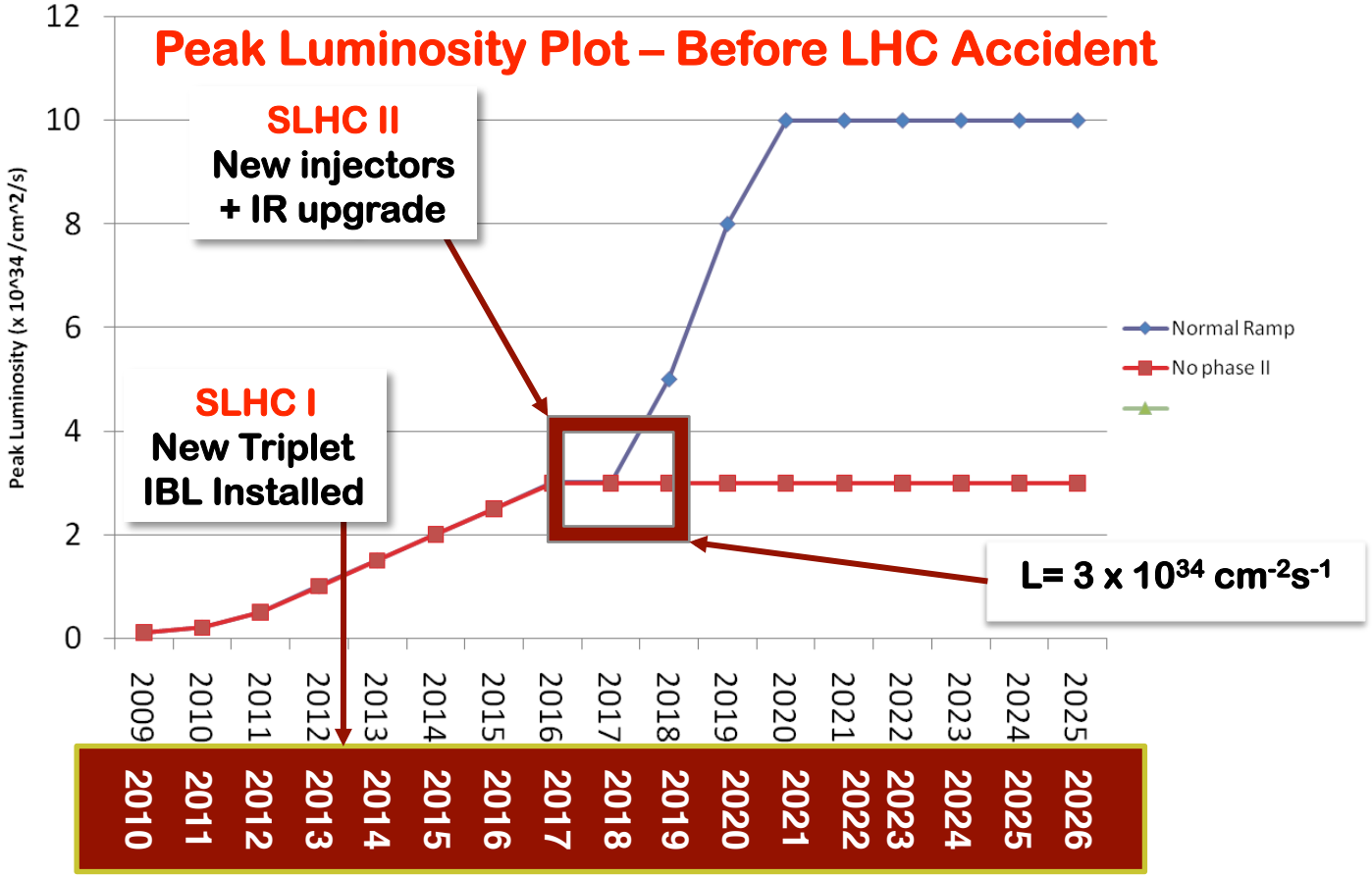
- AUW – 23-27/2/2009 –
  - *Indico agenda: http://indico.cern.ch/conferenceDisplay.py?confId=45460*
  - *Some statistics: 29 Sessions ~232 Talks ~232 People?*

- AUW themes:
  - *Moving from R&D based towards a systematic project*
  - *Phase II LoI - 2010*
  - *Layout Task Force*
  - *Joint TDAQ/Systems effort kick-off*
  - *IBL TDR - Begin 2010*

- AUW News – Phase I delayed by one year: 2013→ 2014
  - *M. Nessi reported L. Evans words.*

- Next AUW
  - *2009 – CERN 26-30/10/2009*
  - *2010 – two AUW (proposed end of September in Prague)*

LHC: Luminosity Plot



Shifted by one year
Ref. F. Zimmermann - AUW

SLHC Phase I delayed by one year 2014
Ref.: M. Nessi (AUW) from L. Evans

Luminosity Plot
Ref. R. Garoby – LHCC 1/7/2008 –
http://indico.cern.ch/conferenceDisplay.py?confId=36149

SLHC

R&D → Systems

- November 2008 - Total of 34 proposals or expression-of-interest submitted since 2005. ~210 Institutes participating (multiple times), 7% of INFN

- Two new EoIs:
  - *TDAQ upgrade (Norman Gee) – see atlas-tdaq@cern.ch mail archive (http://groups.cern.ch/)*
  - *LV1 track trigger (Richard Brenner) – see: https://edms.cern.ch/document/985096*

- R&Ds working groups as backbone of LoI
  - *mapped into LoI sections.*

Inner Tracker R&D

Status – November 2008
Approved by Executive Board
EoI, Proposal presented to USG

Pixel
Strips
Inner Detector

Approved Document	Short name	Title	Principle contact	Institutes
ATL-PA-MN-0007	**3D Sensors**	Development, Testing and Industrialization of Full-3D Active-Edge and Modified-3D Silicon Radiation Pixel Sensors	Cinzia Da Vià, Sherwood Parker, Giovanni Darbo	*CNM Barcellona, Bonn, Freiburg, **Genova**, Glasgow, Hawaii, LBNL, Manchester, Oslo, SINTEF Oslo, Prague, MBC/Stanford, IRST Trento, Valencia*
ATU-RD-MN-0010	**Thin Pixels**	R&D on thin pixel sensors and a novel interconnection technology for 3D integration of sensors and electronics	H-G. Moser	*Bonn, Dortmund, Interon, MPP Munich, Oslo*
ATU-RD-MN-0012	**Diamond**	Diamond Pixel Modules for the High Luminosity ATLAS Inner Detector Upgrade	Marko Mikuž	*Bonn, Carleton, CERN, Jožef Stefan Institute, Ohio State, Toronto*
ATL-P-MN-0016	**Gossip**	R&D proposal to develop the gaseous pixel detector Gossip for the ATLAS Inner Tracker at the Super LHC (SLHC)	Harry van der Graaf	*NIKHEF, SACLAY, Twente*
ATU-RD-MN-0016	**Pixel Local Supports**	Expression of Interest Research and Development Local Supports for Pixel Detector Upgrades	M. Gilchriese	*CPPM, **Genova**, **Milano**, LAPP, LPNHE, LBNL, Ohio, SLAC, Toronto, Washington, Wuppertal*
ATU-RD-MN-0019	**Planar Pixel**	R&D on Planar Pixel Sensor Technology for the ATLAS Inner Detector Upgrade	D. Muensterman	*Prague, LAL Orsay, Bonn, HU Berlin, TU Dortmund, MPP Munich, MPI Munich, **Udine**, Liverpool, UNM Albuquerque, UCSC Santa Cruz.*
ATL-PA-MN-0002	**ABC-Next**	Proposal to develop ABC-Next, a readout ASIC for the S-ATLAS Silicon Tracker Module Design	Francis Anghinolfi, Wladek Dabrowski	*Cambridgs, CERN, Geneva, Glasgow, Krakow, KEK, Liverpool, London, Ljubljana, Santa Cruz, Valencia*
ATL-PA-MN-0004	**Staves**	Development and Integration of Modular Assemblies with Reduced Services for the ATLAS Silicon Strip Tracking Layers	C. Haber, M. Gilchriese	*BNL, Hampton, Santa Cruz LBNL, New York, **Milano***
ATL-PA-MN-0005	**n-in-p sensors**	Development of non-inverting Silicon strip detectors for the ATLAS ID upgrade	Hartmut Sadrozinski	*KEK, Tsukuba, Liverpool, Glasgow, Lancaster, Sheffield, Cambridge, London, Freiburg, MPI, Ljubljana, Prague, Barcelona, Valencia, Santa Cruz, BNL*
ATL-PA-MN-0006	**SiGe chips**	Evaluation of Silicon-Germanium (SiGe) Bipolar Technologies for Use in an Upgraded ATLAS Detector	Alex Grillo, S. Rescia	*IN2P3, CNM Barcelona, BNL, UC Santa Cruz, U of Pennsylvania*
ATU-RD-MN-0007	**Modules**	R&D towards the Module and Service Structure design for the ATLAS Inner Tracker at the Super LHC (SLHC)	Yoshinobu Unno	*KEK, Geneva, Freiburg, Melbourne, Valencia, Tsukuba*
ATU-RD-MN-0009	**SoS**	Expression of Interest: Evaluations on the Silicon on Sapphire 0.25 micron technology for ASIC developments in the ATLAS electronics readout upgrade	Ping Gui, Jingbo Ye	*SMU Dallas.*
ATL-PA-MN-0001	**Opto**	Radiation Test Programme for the ATLAS Opto-Electronic Readout System for the SLHC for ATLAS upgrades	Cigdem Issever	*Taiwan, Ljubljana, Ohio, Oklahoma, Oxford, SMU*
ATU-RD-MN-0008	**Powering**	Research and Development of Power Distribution Schemes for the ATLAS Silicon Tracker Upgrade	Marc Weber	*BNL, Bonn, CERN, Krakow, LBNL, RAL, Wuppertal, Yale*
ATL-P-MN-0011	**Thermal Management**	Future ATLAS tracker Thermal Management Research Programme	Georg Viehhauser	*BNL, CERN, **Genova**, Glasgow, KEK, LBNL, Liverpool, Marseille, NIKHEF, Oxford, Prague, QMUL, RAL, Sheffield*
ATL-P-MN-0026	**ID Alignment**	R&D on an Optical Alignment System for the ATLAS Tracker Upgrade at SLHC Based on Straightness Monitoring	J. Dubbert, S. Horvat, O. Kortner, **H. Kroha**, H.-G. Moser, R. Richter	*MPI Munich*

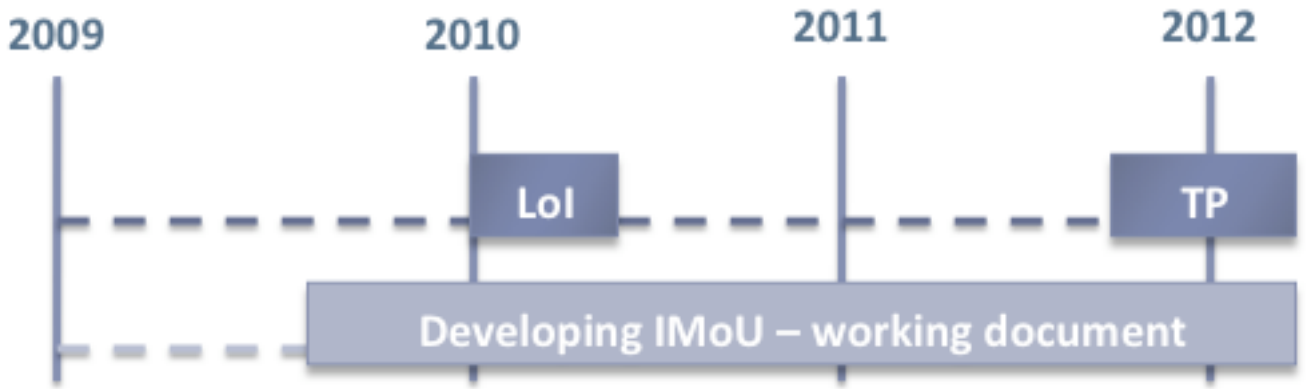
Calorimeter, Muon & Other R&D

Status – November 2008
Approved by Executive Board
EoI, Proposal presented to USG

Calorimeter
Muon
Trigger, Elec, …

Approved Document	Short name	Title	Principle contact	Institutes
ATL-P-MN-0015	**End-Cap LArCAL**	A Proposal for R&D to establish the limitations on the operation of the ATLAS End-Cap Calorimeters at high LHC Luminosities	Peter Shacht	*Arizona, JINR Dubna, IEP Kosice, Mainz, LPI Moscow, MPI Munich, BINP Novosibirsk, IHEP Protvino, TRIUMF Vancouver, Wuppertal*
ATU-RD-MN-0001	**Lar FE Electronics**	R&D Towards the Replacement of the Liquid Argon Calorimeter Front End Electronics for the sLHC	G. Brooijmans	*CERN, LAL-Orsay, **Milano**, MPI Munich, BNL, Columbia, SMU, New York, Pennsylvania*
ATU-RD-MN-0002	**LAr Optolink**	R and D of a radiation resistant high speed optical link for the ATLAS Liquid Argon Calorimeter readou	Jingbo Ye	
ATU-RD-MN-0003	**LAr ROD**	Research and Development of Readout Driver (ROD) for the upgrade of the Liquid Argon Calorimeter Front-End Readout	Hucheng Chen	*Arizona, BNL, CERN, LAPP, **Milano**, Stony Brook*
ATU-RD-MN-0004	**FCAL Cold**	Development of new ATLAS Forward Calorimeters for the Upgrade	J.Rutherfoord	*Arizona, Carleton, Toronto.*
ATU-RD-MN-0015	**Tile Electronics**	R&D on Tile Calorimeter Electronics for the sLHC	C. Bohm, L. Price, J. Valls Ferrer	*Argonne, Barcelona, Bratislava, CERN, Chicago, Lisbon, **Pisa**, Prague, AS CR, Stockholm, Valencia.*
ATU-RD-MN-0011	**Micromegas**	R&D project project on micropattern muon chambers fo SLHC	V. Polychronakos, J. Wotschack	*Arizona, Athens (U, NTU, Demokritos), Brookhaven, CERN, Harvard, Istanbul (Bogaziçi, Doğuş), **Naples**, Seattle, USTC Hefei, South Carolina, St. Petersburg, Shandong, Thessaloniki*
ATL-P-MN-0014	**Segmented Straw**	R&D of segmented straw tracker detector for the ATLAS Inner Detector Upgrade	Vladimir Peshekhonov	*JINR Dubna, Lebedev Moscow, Moscow, Warsaw*
ATL-P-MN-0028	**TGC**	R&D on Optimizing a detector based on TGC technology to provide tracking and trigger capabilities in the MUON Small-Wheel region at SLHC	G. Mikenberg	*BNL, The Weizmann Institute, Tel Aviv, Technion*
ATL-P-MN-0029	**MDT R/O**	Upgrade of the MDT Readout Chain for the SLHC	R. Richter	*LMU & MPI Munic*
ATL-P-MN-0030	**MDT-Gas**	R&D for gas mixtures for the MDT detectors of the Muon Spectrometer	P. Branchini	***Cosenza**, **Roma3***
ATL-P-MN-0031	**MDT-Selective R/O**	R&D on Precision Drift-Tube Detectors for Very High Background Rates at SLHC	R. Richter	*LMU & MPI Munic*
ATL-P-MN-0032	**High Rate MDT**	R&D on Precision Drift-Tube Detectors for Very High Background Rates at SLHC	R. Richter	*LMU & MPI Munic*
ATU-RD-MN-0013	**Fast Track Trigger**	Proposal to prepare a technical design report for FTK, a hardware track finder upgrade to the ATLAS trigger	M. Shochet	*Chicago, **Frascati**, Harvard, Illinois, **Pisa**, **Roma 1**.*
ATU-RD-MN-0014	**LVL1-Calo**	ATLAS Level-1 Calorimeter Trigger Upgrade	N. Gee	*Birmingham, Heidelberg, Mainz, London, Stockholm, RAL, Michigan, ANL*
ATU-RD-MN-0018	**Versatile Link**	The Versatile Link Common Project	Francois Vasey	*CERN, Strasbourg, Oxford, SMU Dallas.*
ATL-PA-MN-0003	**Radiation BG**	Radiation background benchmarking at the LHC and simulations for an ATLAS upgrade at the SLHC	Ian Dawson	*Sheffield, Arizona, Ljubljana*
ATU-RD-MN-0020	**Forward Protons**	ATLAS FP: A project to install forward proton detectors at 220 m and 420 m upstream and downstream of the ATLAS detector	A. Brandt	

LoI – Time Line



Immediate Needs:

- Propose LoI outline – going through today to get first feedback
- Set up an editorial board - 2 main editors
- Review working groups, overall (sub-)systems contacts – appoint chapter editors
- Include the current R&D projects in working groups as appropriate
- Spot critical issues

Ref. M. Capeans – Upgrade PO & SG -3/3/2009

LoI Structure

Intro & Overview

Sub-systems

Performance

Installation

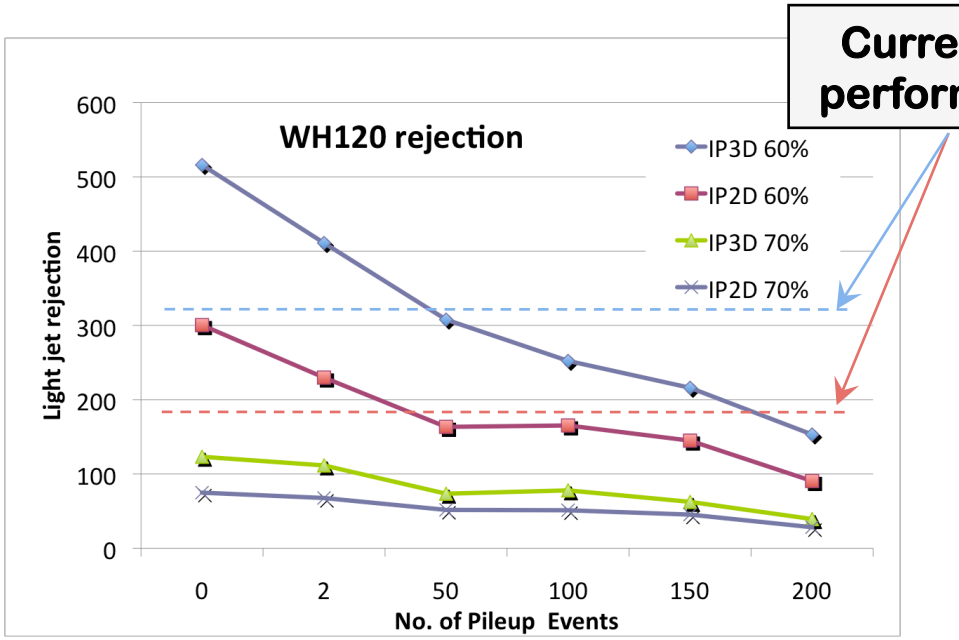
Responsibilities

1) LoI Structure			2) Existing Working Groups or Defined Overall Contacts		3) Links in USG		4) Existing R&D Projects		5) Technology-driven R&D	
Members of the ATLAS Upgrade Collaboration							*In green, means APPROVED*		**SiGe chips (ID, LAr)**	A.Grillo, S.Rescia
									SoS	J.Ye
Introduction & Overview	Physic Goals								**Opto link**	C.Issever
	Current Detector Performances and Limitations								**Versatile Link**	F.Vasey
	Upgrade Motivation									
	Experimental conditions (rad levels, rates, pile-up, etc)									
	Detector Upgrades									
	Unaffected systems									
	Possible upgrades scenarios									
Radiation Environment	Simulations and comparison with exp. data		**Radiation**	I.Dawson			**Radiation BG**	I.Dawson		
	Doses, background studies									
	Re-evaluation rad damage for different LHC working points									
Inner Tracker	Physics Requirements at SLHC and Current Performances				**ID system**	A.Seiden, G.Darbo, TRT Rep.				
	Layout:	Physics requirements	**Layout**	N.Hessey						
		Trigger potential	**(to be handled by TASK FORCE)**							
		Mechanics & Services								
		Beam pipe issues								
	PIXEL system		**B-layer replacement (for phase I)**	G.Darbo			**3D Sensors**	S.Parker, C.Da Via		
			(understand Pixel PhaseI organization)				**Thin Pixels**	H.G.Moser		
							Diamond	M.Mikkuz		
							Planar pixel	D.Muenstermann		
							Pixel Support	M.Gilchriese		
							Gossip	H.van der Graaf		
	Short strip system		**Silicon sensors**	N. Unno			**Staves**	G.Haber, M.Gilchriese		
	Long strip system		**Module Integration**	P.Allport			**ABCNext**	F.Anghinolfi, W.Dabroswski		
			Module production & qualification				**n-in-p sensors**	H.Sadrozinski		
	Front-End electronics		**Electronics**	P.Farthouat						
	Assembly, integration (Services)		**Engineering & Integration**	A. Catinaccio			**Modules**	N.Unno		
			Thermal Management	G.Viehhauser			**Powering**	M.Weber		
			Services	N.Massol			**ID alignment**	H.Kroha		
Calorimeter System	Physics Requirements at SLHC and Current Performances				**LAr system**	F.Lanni, C.Zeitnitz				
	Electronics changes		**Electronics**	P.Farthouat	**Tiles**	C.Bohm	**FCAL cold**	J.Rutherfoord		
	LAR Barrel						**Lar FE electronics**	G.Broojimans		
	LAR EC						**Lar Optolink**	J.Ye		
	FCAL						**Lar ROD**	H.Chen		
	Tiles						**Tile-electronics**	C.Bohm		
Muon Spectrometer	Physics Requirements at SLHC and Current Performances									
	Muon rates				**Muon system**	T.Kawamoto	**Muon Micromegas**	V.Polychronakos, J.Wotschack		
	Tracking systems upgrade:		**Electronics**	P.Farthouat			**MDT readout**	R.Richter		
		Big Wheels					**MDT Gas**	P.Branchini		
		Small Wheels					**Selective readout**	R.Richter		
							High rate MDT	R.Richter		
	Trigger systems upgrade						**TGC**	G.Mikenberg		
Trigger and DAQ	Physics Requirements at SLHC and Current Performances				**TDAQ**	N.McGee	**Fast Track Trigger**	M.Sochet		
	Changes to lvl1 trigger						**LVL1-Calo**	N.Gee		
	Changes to HLT trigger						**Track-Trigger**	R.Brenner		
Computing	Changes in computing infrastructure					None currently				
Detector Performance	Expected Detector Performance for different scenarios			C.Young, A.Rimoldi						
	Trigger Rates					To be discussed				
	Physics performance					To be discussed				
Experimental Area, Integration and Installation	Changes of general infrastructure		**Cooling**	A.Cattai						
	DCS		**ID DCS**	D.Ferrere						
	Beam pipe and machine interface			R.Vuillermet	**Machine Interface**	P.Grafstrom				
	Installation scenarios		**Engeneering & Integration**	A. Catinaccio						
	Handling, removal and storage of parts (radiation aspects)									
	Safety aspects			O.Beltramello						
Cost and Responsibilities	Collaboration & Management Structure									
	R&D Projects			N.Hessey						
	Schedules			I.Wilmut						
	Responsibilities									
	Cost (for different scenarios)									

Ref. M. Capeans
Upgrade PO & SG -3/3/2009

Layout Task Force

- 3 ID strawman layouts for SLHC have been studied so far (2006, 2007, 2008)
- Limitations have shown-up at <<400 pile-up events
- A LoI for SLHC is due early 2010, we therefore must converge on a defendable ID layout by then.

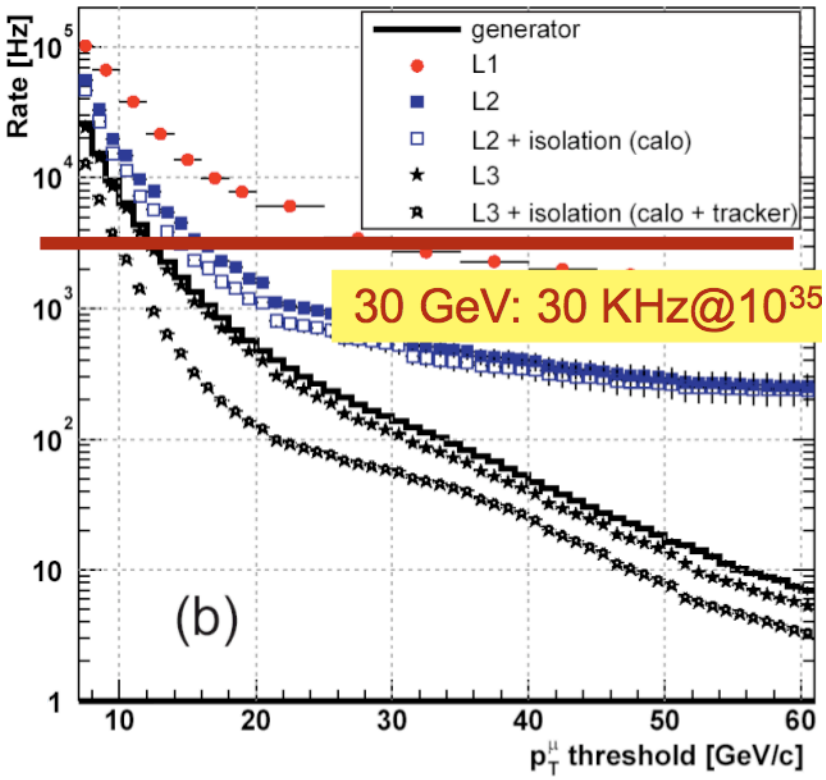


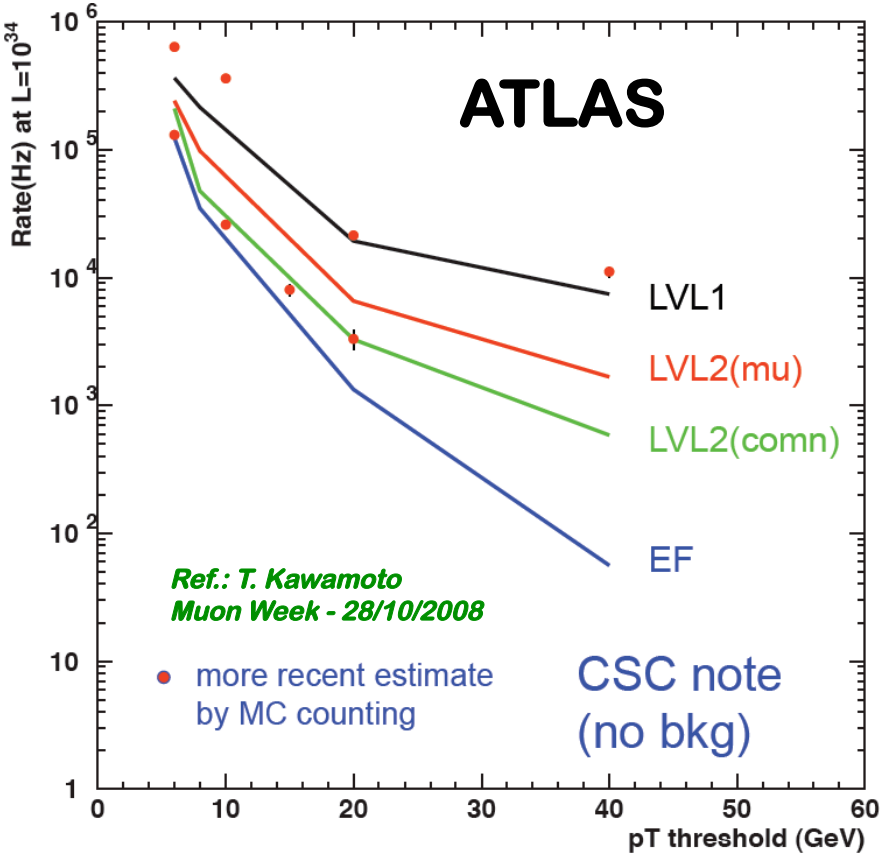
- Task Force:
  - *Chaired by: Leonardo Rossi*
  - *Report in 6 months*
  - *First ideas and strategy at AUW*

Ref. L. Rossi - AUW

Single Muon Triggers

From CMS-DAQ TDR





- No control of rate for p_T>20 GeV/c
- Physics rates still OK pT>20 GeV/C
  - *CMS : L3 - ATLAS : EF*
- Use track trigger?
  - *CMS going this way, ATLAS is still studying a solut6ion.*

TDAQ & LV1

Ref. N. Gee – AUW & R. Brenner ATUW (Nikhef)

- SLHC Phase I
  - *Several detectors have limited event volume; L1A rate at 3 x 10^{34} will be limited to 50-60kHz at 100% traffic levels*
  - *Some detector inefficiencies as latency approaches 2.5 μs*
- SLHC Phase II
  - *Several detectors can use fast clear or trigger directly from level 1.5*
  - *For most, 6.4 μs latency is fine. Exception is muon 3.2 μs*
  - *Options to improve muon trigger rates by adding chambers*
- Write R&D proposal for TDAQ upgrade work
  - *Define document structure, appoint chapter editors,…*
  - *Covering Phase-I and Phase-II, plus evolution*
- Level-1 Trigger
  - *Phase I topological upgrade – (Still need to prove that this is useful…)*
  - *Phase II – Track Trigger: both simulation and hardware studies underway → progress at the AUW → need lot of efforts for answers to LoI*

Sestri Levante

- Incontro a Sestri Levante:
  - *Locazione decentrata*
  - *Alitalia e blocco per incidente dell'autostrada la hanno resa più remota*
  - *Ma la tranquillità del luogo ha permesso una maggior concentrazionesui temi in discussione.*
- 50 partecipanti:
  - *ATLAS, CMS, CSN1 (Nando + referee), Umberto e Sergio sono intervenuti in remoto (la GE li ha trattenuti a Roma).*
- Sito WEB:
  - *http://iacu-2008.ge.infn.it/*

Sestri Levante - Participants

See report to CSN1

Outcome: ATLAS, CMS & INFN

- Upgrade degli Esperimenti
  - *Per entrambi gli esperimenti la sfida sono l'ottenimento di prestazioni "simil LHC":*
    - Prestazioni del tracker interno e L1 trigger sono la difficoltà maggiore.
  - *Il management INFN ha preso atto dell'esistenza di una importante comunità Italiana che guarda al futuro di LHC (SLHC)*
- ATLAS e CMS @ Phase I
  - *ATLAS: B-Layer – "Impossibile" sostituirlo -> IBL*
  - *CMS: Il rivelatore a Pixel ha meno "vincoli" -> varie opzioni possibili*
- R&D per SLHC
  - *In futuro gli R&D in cui il CERN si impegnerà dovranno essere finalizzati alle necessità degli esperimenti che per gli upgrade.*
  - *Nell'INFN gli R&D devono essere "strategici" per la partecipazione delle comunità negli upgrade degli esperimenti. Partecipazione a SLHC di entrambi ATLAS e CMS, ma concentrazione delle attività per mantenere visibilità.*
  - *La CSN1 ha una tasca per il 2009… ai referee il giudizio sulle attività…*

Organization, INFN interests, money.

IBL

IBL Organization

- Project Leader (IBL-PL) endorsed by ATLAS CB
  - *Technical Coordinator (IBL-TC): H. Pernegger*
- Organization structure in preparation:
  - *Project is an ATLAS Upgrade for Phase I*
  - *Thinking at working groups (WG), technical board (TB), steering group – covering all project (Pixel CORE and TC)*
  - *Report line to Pixel Institute Board (PIB) and Upgrade Project Office (PO)*
- TDR – Early 2010
  - *2 editors (one senior) with overall knowledge of the Pixel detector and involved/interested in the IBL project.*
  - *Try to reduce options for TDR:*
    - Cooling (CO2 – C3F8): 2 kW CO2 cooling plant to gain experience set up at CERN
    - Sensors: reduce options, define requirements and specifications.

INFN Possible Interests - I

- FE-I4
  - *New front-end chip. 50x250μm2 pixels, 26.9k pixels, 160 Mb/s R/O.*
  - *5 labs: Bonn, CPPM, Genova, LBNL, Nikhef*
- Sensors
  - *3D & Planar (n-in-n) sensors are the options: 3D more charge after life dose (>3x1015 n/cm2) but scale production needs demonstration. Planar known technology but high Vbias (>800÷1000V) is a system issue.*
  - *Genova (with IRST in 3D) & Udine (3D & Planar) in ATLAS. IRST-FBK, TN & TS in IGRV (3D sensors)*
- Stave mechanics
  - *Low density carbon foam structure with titanium or carbon fiber (CF) pipe option. CF pipe advantages: low X0, thermal matching with carbon foam support, non corrosion issues.*
  - *Good progress in CF pipes: tested at 150 atm, no leakage (<10^{-7} atm•cc/s). New technology: need qualification for micro-crack development, develop fittings, find second source for production*
  - *Milano actively involved in the pipe R&D and in the stave design.*

INFN Possible Interests - II

- Stave Flex Hybrid
  - *Genova interested in the development of the "Stave" Flex Hybrid. Nice complement of the stave design in Milano to which the component is tightly connected.*
- Module/Stave Loading & QC
  - *Genova interested in a role (to be better defined) in the module testing/stave loading & qualification process.*
- PP2
  - *Milano interested in the PP2 deliverable. They will provide it, if design need minimum changes (no redesign of the board).*
- Other deliverables / activities
  - *Under investigation possible contribution on other parts:*
  - *ROD? Existing ROD could be used with DSP code rewriting and FPGA reprogramming, but new design could bridge to SLHC design & improve architecture (slow VME bus access, more memory). Bologna considering ROD deliverable, Italian leading role in Pixel DAQ could play a role.*
  - *Opto-link: opto-chip design if a redesign is needed? Milano may contribute.*

IBL – Costi e Finanziamenti

- Costo e finanziamento del progetto in via di definizione
  - *Il costo del progetto in via di definizione. Presentato all'RRB un piano per 4.4MCH nei MOF-B (2009÷2012) che copre il costo "Pixel CORE". Altri finanziamenti tramite nuovi laboratori e MOF-A (Installazione. Cooling plant, new beam-pipe) coprono il rimanente 50%.*
  - *L'INFN è supposto contribuire in modo diretto per il 25% dei 4.4 MCH dei MOF-B e indiretto tramite I MOF-A.*

- MOF-B del 2009. Sono disponibili 134 k€ (201 kCH) di sj.
  - *Opportuno avere una definizione del progetto (interim MoU) prima di sbloccare la somma. Responsabilità italiane e del resto della collaborazione in via di definizione.*

Richieste IBL R&D

- Genova:
  - ***80 k€****: recupero assegnazione 2008 andata in residuo (quota FE-I4 + contributo*
  - ***10 k€****: deposizione bumps (4 wafers sensori) e flip-chip (~40 single chip devices)*
- Milano (vedi presentazione Danilo):
  - ***5 k€****: una mini serie di tubi in CF (prototipi già realizzati) per testarne l'affidabilità sotto i vari aspetti: resistenza alla pressione, resistenza alla radiazione, misure di coefficienti termici, etc*
  - ***10 k€****: prototipo di stave completo da caratterizzare sotto vari aspetti e confrontare con le simulazioni realizzate dall'officina meccanica.*
  - ***20 k€****: per sviluppare i fitting in fibra di carbonio tra lo stave e il circuito di cooling fino a PP1, che funzionino ad alta pressione*
- Udine (vedi presentazione Mario Paolo):
  - ***10 k€****: sviluppo e test sensori*
  - *Missioni: MI 1k€, ME 4mu.*

Richieste IBL – Sommario 03/09

- Sommario richieste Pixel IBL and SLHC R&D e IBL prototipaggio / costruzione.

Richieste Pixel R&D SLHC / IBL - Marzo 2009					
Sezione	**Capitolo**	**Descrizione**	**Rias.08**	**Tasca SLHC**	**MOF-B IBL**
GE	*Cons*	deposizione bumps (4 wafers sensori) e flip-chip (~40 single chip devices)		k€ 10.0	
		b-layer replacement: produzione sensori 3D alla FBK (ex IRST), 12 maschere, run di 25 wafers	k€ 20.0		
		b-layer replacement: pertecipazione (al 25%) al run del circuito di front-end (FEI4)	k€ 60.0		
MI	*Cons*	BL-replacement -materiale per realizzazione protostave e misure termiche		k€ 10.0	
		BL-replacement - R&D fitting per alta pressione		k€ 20.0	
		BL-replacement - prototipi per qualificazione stave carbonio omogenei (50*100€each)		k€ 5.0	
		MOF-B IBL (201 kCH) - non richiesti a Marzo			k€ 134.0
PI	*Cons*	R&D slim edge sensori		k€ 10.0	
UD	*Cons*	Partecipazione produzione sensori planari (10% totale)		k€ 10.0	
		Totale richieste Blayer	***k€ 80.0***	***k€ 65.0***	***k€ 134.0***

Richieste IBL: Settembre '08

Corretta

Sezione	Capitolo	Descrizione	Richieste	sj
GE	*Cons*	b-layer replacement: prototipo servizi compatibile con il dispositivo attuale	k€ 8.0	
		b-layer replacement: verifica e manutenzione delle 2 clean rooms	k€ 10.0	
		b-layer replacment: bump di 10 moduli alla AMS-Selex (ex Alenia)	k€ 10.0	
		b-layer replacement: produzione sensori 3D alla FBK (ex IRST), 12 maschere, run di 25 wafers	k€ 27.0	**Anticipi GE 80 k€**
		b-layer replacement: pertecipazione (al 25%) al run del circuito di front-end (FEI4)	k€ 60.0	
MI	*Cons*	BL-replacement -materiale per realizzazione protostave e misure termiche	k€ 10.0	
		BL-replacement - R&D fitting per alta pressione	k€ 20.0	
		BL-replacement - prototipi per qualificazione stave carbonio omogenei (50*100€each)	k€ 5.0	
		Consumi per camera pulita	k€ 3.0	
		MOFB Pixel 553 kCHF di cui 261kCHF BL Repl.s.j.		k€ 163.0
UD	*Cons*	licenza software per laboratorio	k€ 2.0	
		calibrazione strumenti per laboratorio	k€ 3.5	
		bombole azoto + consumi lab	k€ 5.0	**Sono 134 k€ sj**
		manutenzione deumidificatore camera pulita	k€ 0.5	
		Partecipazione produzione sensori planari (10% totale)	k€ 10.0	
	Inv	PC per laboratorio	k€ 2.0	
		impulsatore AGILENT- generatore di segnale a due canali per studi di charge pumping descritti nel proposal per i sensori planari (B-layer replacement)	k€ 20.0	
		Totale richieste Blayer	***k€ 196.0***	***k€ 163.0***

Richieste finanziarie. Vedi presentazioni separate.

R&D SLHC

Richieste R&D: LAr (FE Elec)

- Interesse manifestato per sviluppo d'elettronica di front-end per calorimetria (nel 2007 e 2008 CSN1, Sestri Levante):
  - *Vedi presentazione Mauro di oggi.*

- Richieste finanziarie per sviluppo elettronica di front-end per calorimetri (Milano):
  1. *Realizzazione di una piccola facility di test per la caratterizzazione delle diverse tecnologie (Progettazione e realizzazione di PCB, Componentistica varia, Schede di interfaccia/acquisizione/ memorizzazione):* ***7 k€***
  2. *Test con radiazioni (Protoni al TSL di Uppsala (~ $2x10^{14}$ p/cm^2), Tempo fascio, 11x800 €/ora + set-up dedicato):* ***11 k€***
  3. *Partecipazione ad una nuova sottomissione di un test chip (Insieme con le altre istituzioni, lo schema temporale dipende dai risultati sul primo test chip IBM. Possibile nuova sottomissione fine 2009, inizio 2010):* ***15 k€****.*

Altre Richieste: …

- Ricevuto solo possibile richiesta di 2 k€ per micromega.

- Altro?
  - *discussione*

Richieste SLHC – 09/08 e 03/09

Richieste Settembre 2008

Sezione	Capitolo	Descrizione	Richieste	sj
LNF	*Cons*	3 evaluation boards Xilink (6KEuro), tranceiver ottici e componentistica elettronica varia (2KEuro) per R&D di FastTrack (FTK)	k€ 8.0	
	Inv	Modulo per pattern generator per R&D di FastTrack(FTK)	k€ 16.0	
MI	*Cons*	SI-Ge-prototipi 24ke - irraggiamento 16ke	k€ 40.0	
NA	*Cons*	SLHC: prototipi rivelatori	k€ 4.0	
		SLHC: gas (3k€) e sonde gas infiammabile (2k€) per la stazione di test di Napoli	k€ 5.0	
		SLHC: elettronica di front end per i prototipi	k€ 3.0	
	Inv	SLHC: TDC VME	k€ 5.0	
		SLHC: HV power supply (sensib.1nA)	k€ 3.0	
PI	*Cons*	Sviluppi elettronica FE (SLHC)	k€ 4.0	
		attrezzature banco optoelettronico: test fibre e PMT (SLHC). Posizionatori, diaframmi, polarimetri, fotodiodi calibrati (QE)	k€ 6.0	
	Inv	Alimentatori HV (CAEN 4ch HV NIM Module -N472)	k€ 12.0	
RM2	*Cons*	Costruzione prototipi RPC di piccole dimensioni con elettronica di FE	k€ 5.0	
		Test alla GIF (gas e affitto pool)	k€ 5.0	
		Totale richieste SLHC	***k€ 116.0***	***k€ -***

Richieste Marzo 2009 (Sblocchi)

Sezione	Capitolo	Descrizione	Tasca SLHC
MI	*Cons*	Test setup (boards, schede acquisizione)	k€ 7.0
		Irraggiamenti	k€ 11.0
		Quota engineering run (fine 2009, inizio 2010)	k€ 15.0
NA	*Cons*	Micromega	k€ 2.0
		Totale richieste SLHC	***k€ 35.0***