CERN

R&D plans and Infrastructures

…. And identification of potential items that are suitable for IA

R&D plans

Developments in Detectors, Electronics and Computing/DAQ for future facilities. Compatible with CERN Council strategy, CERN PH department has proposed:

"….9 activities in which a strategic role for CERN has been identified and which concern the development of specific expertise relevant for future projects. Priority has been given to common projects and coordination frameworks, where several experiments will profit from the development….."

- PH department request included in CERN council "White Papers", October 2006
- Reviewed by SPC (CERN/SPC/883 (under point 3, PH Department, Theme 3, Detector R&D)
- Council/FC documents June 2007: CERN/2728/Rev, Theme 3, 13.5 MCHF (including 5 MCHF for Fellows/Students) + 33 FTE, covering years **2008-2011 (2010)**
- Despite Council approval, final budget allocation still unknown

R&D activities in microelectronics & optoelectronics

1. Radiation-hard Technology and Common Building Blocks
   - Radiation qualification of deep sub-micron IC technology and IP blocks for HEP applications
2. On-detector Power Management
   - DC-DC conversion, Linear Voltage regulation
3. Radiation-hard Optical Link for Experiments
   - Development of high speed bidirectional radiation hard optical link

R&D activities in microelectronics & optoelectronics

Developments in microelectronics and optoelectronics are based on input from:

ALTAS CMS electronics workshop (ACES)
http://indico.cern.ch/conferenceDisplay.py?confId=10010

Optoelectronics working group:
http://indico.cern.ch/categoryDisplay.py?categId=555

Further details (e.g. powering), in Topical Workshop on Electronics for Particle Physics:
http://www.particle.cz/conferences/twepp07/

R&D in detector technologies

4. Radiation Hard Semiconductor Detectors
   - Continued participation in RD50, integration into LHC tracker upgrades
5. Micropattern Gas Detectors
   - Participate in technology developments and help setting up an MPGD collaboration framework
6. Interconnect Technology and Quality Assurance
   - Explore technologies for interconnects, vias, hybridisation, thermo-mechanical module design, quality assurance methodology (in clean room / assembly+QA facility)
7. Facilities and Component Analysis for Detector R&D
   - SHLC compatible GIF and hadron irradiation facility; gas mixture choices and purification techniques

MPGD workshop

"MPGD; towards and R&D collaboration"
September 10-11 2007

http://indico.cern.ch/conferenceDisplay.py?confId=16213
~100 persons registered
>35 talks

Rather clear interest to set up a technology collaboration
Main issues for common work:

- Technology developments
- Stability studies, ageing
- Detector simulation tools
- Electronics
- Common testbeam and irradiation facilities

Physics data analysis, simulation and computing

8. Parallelization of Software Frameworks to exploit Multi-core Processors
   - Adapt and optimise existing software frameworks in the LHC experiments to run in multi-core processors
9. Portable Analysis using Virtualization Technology
   - Development of "Virtual Appliances" to provide a complete data analysis environment specialized for each of the LHC experiments

Directly supported as priority development items by the LHC collaborations.

SLHC-PP project

FP7 CNI (constructing new infrastructures) proposal, accepted by EU (5.2 MCHF EU funding). Project comprises Coordination, Support and Technical work for SLHC accelerator and experiments:

- S-ATLAS coordination of collaboration and Project Office
- CMS2 coordination of collaboration and Technical Coordination Unit
- Tracking detector power distribution (DC-DC conversion, serial powering)

CERN infrastructures

- Test beams
- Irradition facilities (PS and GIF), both need upgrading to:
  - New GIF, with PS/SPS beam
  - Enlarged PS facility with separation proton/neutrons
  - New irradiation facility at future injector complex???
- Major clean room facilities:
  - Departmental silicon facility and bonding lab (bld 186)
  - ATLAS inner detector clean room SR1
  - CMS tracker integration centre (bld 186)
- Microelectronics infrastructures/services (chip tester, X-ray irradiation, 100 keV electron beam)
- Specialised service for detector Gas supply, with gas analysis facilities