Detector session: Round table discussion

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European Strategy for Future Neutrino Physics

CERN, 2 October 2009

Round table program

1. Physics performance:
   - Points affecting the sensitivity which have still to be clarified
   - Possible roles on the future physics scenarios of the various techniques.
   - Synergies with non-accelerator physics
2. Cost and feasibility
   - Cost and feasibility drivers
   - Key R&D points towards cost reduction and technological challenges
3. R&D roadmap
   - R&D planning
   - Intermediate steps
   - Test beam measurements
   - The role of CERN

Physics performance and synergies

		channels			facilities						features			performance	
	E range	μ	e	τ	NF	LENF	High γ βB	Low γ βB	off-axis SB	Wide band SB	B field	mass Kton	near detector	E resol	Eff & bkg
MIND															
TASD															
LAr															
WC															

	synergies with astroparticle	near detector physics	Baseline and depth of experimental sites	Interplay with program in other regions
MIND				
TASD				
LAr				
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Physics performance and synergies

- Which is the ultimate limit for the muon (and charge) identification threshold in MIND ?
- Complementarity among TASD and MIND and possible synergies
- Electron charge measurement in TASD
- Tau appearance in TASD
- LAr performance at a NF (golden, silver and platinum)
- WC performance at high energy (LBL)
- Efficiency and background for electron identification
- Synergies with astroparticle Physics and requirements on the experimental sites

Feasibility and cost

	cost/Kton	cost driver	feasibility driver	key R&D points	requirements on site
MIND					
TASD					
LAr					
WC					

Feasibility and cost

- Plans for costs estimates for each of the detectors
- Cost drivers
- Feasibility drivers
- Availability of WLS fibres
- Key R&D points towards cost reduction and technological challenges
- Projected costs for electronics and photodetectors

R&D planning and CERN role

	How to use existing detectors to understand performance	Required test beam measurements to understand performance	R&D towards cost reduction	R&D towards technological challenges	Intermediate steps towards full scale detector	Expertise in Europe	Possible R&D activities at CERN
MIND							
TASD							
LAr							
WC							

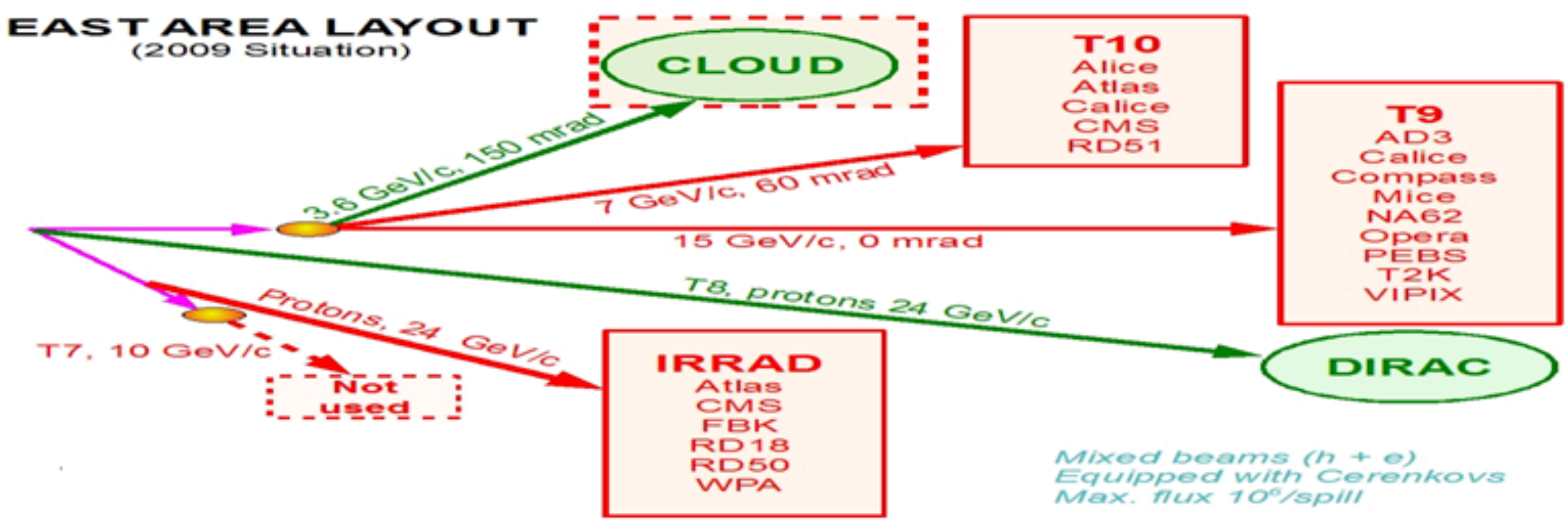
R&D planning and CERN role

- Required test beam measurements to understand the performance of each of the detectors
- Intermediate steps towards full size detectors
- Possible test beam activities at CERN
- Organisation at CERN

TEST BEAMS AT CERN FOR DETECTOR R&D

1 PS East Area

- Secondary beam : 1 ÷ 15 GeV/c
- Particle types: electrons, hadrons, muons
- Intensity : 10^3- 10^4, max $1 \div 2 \times 10^6$ particles/spill
- Spill structure: 400 ms length, 1 spill/33.6 s (PS sc)

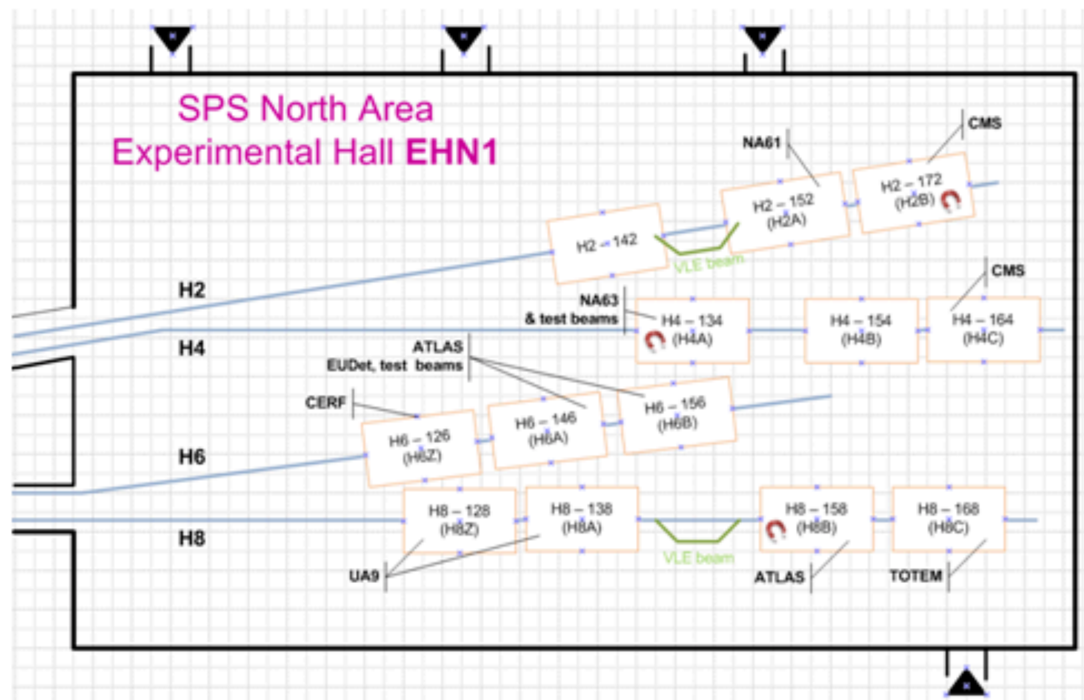


Courtesy of I. Efthymiopoulos (CERN)

TEST BEAMS AT CERN FOR DETECTOR R&D

2 SPS North Area

- H2, H4, H8 : 10 ÷ 400(450) GeV/c
  - H8 : attenuated proton beam
  - H2 and H8 : have a VLE branch → beams 1-9 GeV/c
- H6 10-200 GeV/c
- Particle types: electrons, hadrons, muons
- Intensity : max 1÷2 × 10^8 particles/spill
  - Flat top : 4÷9 sec
  - Cycle : 16.8 ÷49s



Courtesy of I. Efthymiopoulos (CERN)

An example of R&D organisation at CERN: R&D for LHC detectors

Detector Research and Development Committee (1990-1995)

R&D projects and proposals

RD-1 (P1)
  Scintillating fibre calorimetry at the LHC.
RD-2 (P3)
  Proposal to study a tracking/preshower detector for the LHC.
RD-3 (P5)
  Liquid argon calorimetry with LHC-performance specifications.
RD-4 (P6)
  Study of liquid argon dopants for LHC hadron calorimetry.
RD-5 (P7)
  Study of muon triggers and momentum reconstruction in a strong magnetic field for a muon detector at LHC.
RD-6 (P8)
  Integrated high-rate transition radiation detector and tracking chamber for the LHC.
RD-7 (P4)
  Proposal for Research and Development on a central tracking detector based on scintillating fibres.
RD-8 (P13)
  Proposal to develop GaAs detectors for physics at the LHC.
RD-9 (P21)
  A demonstrator analog signal processing circuit in a radiation hard SOI-CMOS .
RD-10 (P9)
  Proposal to study and improve the radiation hardness of gaseous detectors for use at very high luminosities.
RD-11 (P12)
  Embedded architectures for second-level triggering in LHC experiments (EAST).
RD-12 (P15)
  Readout system test benches.
RD-13 (P16)
  A scalable data taking system at a test beam for LHC.
RD-14 (P17)
  Liquid xenon (krypton) calorimetry.
RD-15 (P18)
  The prism plastic calorimeter: PPC.
RD-16 (P19)
  A digital front-end and readout microsystem for calorimetry at LHC.

RD1-RD50 …