

Outlook by the Physics Coordinator

- Glimpse on (future) physics program of
 - CNGS
 - East Area and North Area (physics and beam tests)
 - short excursion: beam test facilities at other labs
 - (AD, n-TOF were covered in previous session)

Physics Program in the East Area

- **DIRAC (PS212) @ T8 beam line**

(lifetime measurement of $\pi^+\pi^-$ atoms, observation and lifetime measurement of πK atoms)

→ approved for run in 2006/2007/2008

→ expected physics results based on ~ 66000 $\pi\pi$ atoms, ~ 5000 πK atoms (assumption: 2.5 spills per SC (16.8s), 20h/day)

→ **DIRAC in 2006**: expected to test upgraded detector

- lost almost all beam time due to F61S.BHZ01 problems, caused south branch of East Area to be off

→ after 2008: plan to move experiment to North Area

- **CLOUD (PS215) @ T11 beam line**

(study of link between cosmic rays and cloud formation with a cloud chamber)

→ running approved (subject to available resources) for

- 2006, 2007: beam-prototype tests
- 2008, 2009: construction, assembly and commissioning
- 2010, 2011, 2012: beam time

Beam Tests in the East Area

- Requested beam time for 2007 at T7, T9, T10 beam lines
 - 55% of available beam time (75% in 2006)
 - n.b.: East Area tends to fill up during run period (e.g. in 2006: DIRAC, ATLAS & CMS BCMs)
- requests for 2007 (2006):
 - LHC detectors: 23 weeks (29 w)
 - Irradiation: 14 weeks (14 w)
 - Other experiments: 7 weeks (11 w)
- ⇒ less requested beam time in 2007 compared to previous years
 - space experiments (GLAST, AMS,...): detectors (to be) launched
 - LHC experiments: less work on tests, focus on commissioning
- 2008+:
 - interest in p/n irradiation facility will remain (LHC upgrade)
 - otherwise: demand will increase (LHC upgrade), depends on demand of "new kids on the block" (LHC upgrade, detectors for a linear collider, ...)

Beam tests in EA (interesting energy range for calorimeters, particle ID,...) :
beam instrumentation, equipment (e.g. movable platforms) and space in
experimental areas not at the same level as in North Area
⇒ to be considered: improvements to make EA even more attractive for
possible users

CNGS

↳ see previous talk by Edda Gschwendtner

- CNGS: 5 years of running, estimated to deliver $4.5 \cdot 10^{19}$ p.o.t. per year to the OPERA (CNGS1) experiment

(OPERA: search for appearance of tau neutrinos in CNGS beam, evidence for $\nu_{\mu} \leftrightarrow \nu_{\tau}$ oscillation)

→ 2006: CNGS run shortened because of small number of emulsion bricks
(bricks: part of the detector to detect tau neutrinos)

⇐ no physics output expected

- high intensity "pilot run" canceled after ~1 day (water leak in CNGS deflector)

→ 2007: CNGS run depends on number of emulsion bricks installed
- monitored by Committees

⇒ To be considered:

- high intensity "pilot run" at the start beam operation (focus on machines: CNGS, injectors, beam losses and radiation)
- start CNGS physics operation when recommended/approved by Committees

Physics Program in the North Area

- **COMPASS (NA58) @ M2 beam line**

(hadron spectroscopy and study of hadron structure with muon and hadron beams)

→ approved for run in 2007 (muon program)

→ hadron program for 2008+ to be reviewed by the SPS Committee (open presentation in SPSC80 Feb 6 2007)

- **NA48/3 (P-326) @ P0 beam line**

(measurement of the rare decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$)

→ proposal currently under review by the SPSC for

- (2006: test with beam to validate choice of detectors)

- 2007-2008: construction, installation and test

→ 2007: accumulation of $K^+ \rightarrow e^+ \nu$ events

(probe for new physics, Supersymmetry)

- 2009-2010: data taking

Physics Program in the North Area (2)

- NA49-future @ H2 beam line

(measurement of hadron production in AA collisions to search for onset of deconfinement and critical point; study of pA , πA cross sections for neutrino and cosmic ray experiments)

→ proposal to the SPSC (open presentation in SPSC80 Feb 6 2007)

- 2007 run: p+C, p+p (30 days)
- 2008: p+C, p+p (high statistics)
- 2009: ion run, In+In at various energies (10-158 GeV) per nucleon plus proton run, p+p at same energies for cross checks
- 2010 as 2009, but Si ions
- 2011 as 2009, but C ions plus p+Pb run for cross checks

Beam Tests in the North Area

- Requested beam time for 2007 at H2, H4, H6, H8 beam lines
→ ~92% of available beam time (~120% in 2006)
- requests for 2007 (2006):
 - LHC detectors: 43 weeks (70 w)
 - Other experiments: 43 weeks (29 w) (← incl. 30 day request by NA49-future)
 - requests to be recommendation by committee:
 - CRYSTAL Reflection/Collimation (RD22): 7 weeks
 - CALICE (calorimeter for ILC): 4 weeks
 - SILCRAD (pixel for ILC): 4 weeks
 - DREAM (calorimeter concept): 2 weeks
 - request recommended by SPSC
 - P-327 (Study of electromagnetic processes in crystals, e.g. possibility of a crystal undulator): 3 weeks @ H4 in 2007, 3 weeks in 2008
- 2008+:
 - ⇒ beam tests/experiments in the North Area remain popular in the community
 - expect increasing demand from detectors for the LHC luminosity upgrade
 - increasing use of CERN facilities by colleagues working on ILC detectors ?

Test Beams around the World

Laboratory	# beamlines	Particles	Energy Range	Diagnostics	Availability
CERN PS	4	p (prim.) e, h, μ (sec.)	26 GeV 1-15 GeV	Cherenkov, TOF, MWPC	continuous except winter shut down, Duty cycle
CERN SPS	4	P (prim.) e, h, μ (sec.) e, h tertiary	400 GeV 10 - <400 GeV 2 - 10 GeV	Cherenkov, CEDAR, TOF, MWPC	depends on SPS Super Cycle (@ SPS 15% - 30%)
DESY	3	e (prim.) e (sec.)	7 GeV 1 - 6 GeV	no external beam diagnostics	>3 months per year
Fermilab	1	p (prim.) p, K, π , e, μ (sec.)	120 GeV 1 - 85 GeV	Cherenkov, TOF, MWPC, SiStrips, Pixels	continuous (5%), except summer shutdown
Frascati	1	e	25 - 750 MeV		6 months per year
IHEP Beijing	3	e (prim.) e, p, π (sec.)	1.1 - 1.5 GeV (prim.) 0.4 - 1.2 GeV (sec.)	Cherenkov, TOF, MWPC	continuous after March 2008
IHEP Protvino	4	P (prim.) p, K, π , μ	70 GeV 1 - 45 GeV	Cherenkov, TOF, MWPC	one month, twice per year
J-Parc					available in 2009
KEK Fuji	1	e (prim.) e (sec.)	8 GeV 0.5 - 3.4 GeV		available autumn 2007, ~240 days/year
LBNL	1	e (prim.) p n	1.5 GeV < 55 MeV < 30 MeV	Pixel telescope	continuous
SLAC	1	e (prim.) e, p, π (sec.)	28.5 GeV 1 - 20 GeV		parasitic to PEP-II, non- concurrent with LCLS

No beam optics, momentum selection via magnet. New vacuum/control system in 2008, no further improvement foreseen

New beam line (old Meson test beam facility), motivated by ILC community, commissioning just started.

No beam tests possible at KEK. Plan: use Bremsstrahlungs photons from KEKB beam & converters. >100 electrons/s, no primary e for beam tests

electrons from injection booster to Advanced Light Source.
p, n from 88 inch cyclotron

PEP II stops end 2008. Current plans for End Station A undetermined, awaiting lab decision

Conclusions

- *CERN is the place to be!*
 - unique, high quality facilities, excellent expertise and efficient support
 - took long time to build up
 - takes continuous efforts to keep
 - important & fundamental (non-LHC) physics program @ PS/SPS
 - more projects in "committee pipeline"
 - unique possibility of general purpose test beams at high energies
 - 2007: will be used by >47 different groups, O(1500) users
 - expect increasing demand from LHC-upgrade, ILC, ...
 - need feedback/dialog from/with community, e.g. need of a new Gamma Irradiation Facility...