CERN infrastructure

A. Fabich, CERN AB-ATB

All information available at
http://cern.ch/proj-hiptarget
Experimental requirements

What CERN could provide?

- Primarily a technical review
- Cost/estimates exist, but no official CERN management confirmation of availability and support

► Space
► Beam
► Support on
  - installation
  - Cryogenics
  - solenoid power
  - Safety
CERN accelerator chain

- TT2 - transfer tunnel from Proton Synchrotron to AD, SPS
- TT2A - PS transfer line to nToF
Access & transport

- Access to TT2A during PS operation towards SPS possible

- Pedestrian access via TT2
- Material access shaft in TT2
- Tight turn from TT2 to TT2A
Cryogenics

- Dewar at surface
- Supply and exhaust via 60 m long piping
- Reuse of existing equipment
- Details in RAL contribution

Access route for LN2 delivery
Power supply for solenoid

1. Type Alice/LHCb
   - New - Used by LHC exp.

2. West Area power supply
   - From dismantling West Area - Refurbishment needed
### Power supply for solenoid

<table>
<thead>
<tr>
<th>Alice/LHCb</th>
<th>WA PS</th>
<th>required</th>
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</thead>
<tbody>
<tr>
<td>Voltage [V]</td>
<td>&lt; 900</td>
<td>&lt; 1000</td>
</tr>
<tr>
<td>Current [A]</td>
<td>&lt; 7200</td>
<td>&lt; 8000</td>
</tr>
<tr>
<td>costs</td>
<td>~300 kChF</td>
<td>~ 100 kChF</td>
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</tbody>
</table>

- Further use in US or Japan considered

**Power net:**
- 18 kV cells in building 193
- Cable installation ~70 kChF
- Currently investigating impact on power net (spikes)
PS beam

- Momentum: $< 24 \text{ GeV/c}$
- 8 buckets to fill ($h=8$)
  - $T = 2 \mu s$
  - spacing: 250 ns
- 4 bunches (within one sub-cycle)
  - $l = 13 \text{ ns r.m.s.}$
  - to our discretion in the 8 buckets
  - Multi-bunch single turn extraction
- Pulse length: 0.25 - 2 $\mu s$
- Intensity:
  - $< 0.7 \times 10^{13}$ protons/bunch
  - Total $< 3 \times 10^{13}$ p.o.t./extraction
Beam at experiment

- Beam horizontal
  - According to geometer: $\Delta h = 5\,\text{mm over 100m}$
  - Beam height: 121 cm above ground

- Floor horizontal

- Spot:
  - $r < 2\,\text{mm}$
Safety

- Radiation
- Mechanical safety
- Mercury
- LN2 cooling
- High magnetic field
- ...
- “Waste” management

Procedure established:
- Define requirements/specs
- Prepare layout/design
- Safety review

SAFETY CONTACT PERSON FOR ALL MATTERS:
Herve Buret Tel.: 160013 (replacement since Oct.2004, former Bruno PICHLER tel: 16 0889 or 73362)

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>DSO of AB</td>
<td>Paolo CENNINI</td>
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<tr>
<td>General Safety</td>
<td>Bruno PICHLER</td>
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<tr>
<td>Radiation</td>
<td>Thomas OTTO</td>
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<tr>
<td>Gas and Chemicals</td>
<td>Jonathan GULLEY</td>
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<td>Electricity</td>
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<td>Emergency stops</td>
<td>Fritz SZONCSO</td>
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<td>Magnetic Field</td>
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<td>Laser</td>
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<tr>
<td>Fire</td>
<td>Fabio CORSANEGO</td>
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<td>(material also J.Gulley)</td>
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<tr>
<td>Material</td>
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<tr>
<td>Mechanical safety</td>
<td>Alberto DESIRELLI</td>
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<tr>
<td>-- -- -- -- -- --</td>
<td>also Maurizio BONA</td>
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<tr>
<td>Cryogenics</td>
<td>Gunnar LINDELL</td>
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</table>
Radio-Protection

► Activation
  ▪ Beam line
  ▪ Mercury

► High intensity proton beam towards nToF target
  ▪ beam attenuator

► Access
  ▪ protected by
    ▶ Two beam stoppers
    ▶ Upgraded shielding during shutdown 2003/2004
    ▶ Radiation monitor in TT2A
Safety

Mercury loop
► Construction at ORNL
► 6 to 8 Liter mercury
► Experience
  ▪ at ORNL and CERN
► Double containment
► ISO 2919 “sealed sources”

Radiation
► ALARA
► Minimum number of integrated protons
  \(< 3 \times 10^{15} (~100 \text{ pulses})\)
► Activation of area and mercury

Chemicals
► Minimum amount of mercury
► Continuous vapor monitoring
  ▪ Inside secondary containment
► Define procedures/operation
Safety

**Mechanical safety**
- According to CODAP2000/ASME
- Double containment
- Pressure vessel

**Cryogenics**
- Standards used
- ODH study

**Beam attenuator**
- to protect nToF target
- controls, interlocks

**decommissioning**
- Waste management
Decommissioning

- removal of all equipment
  - Approx. 2 weeks to restore beam line

- “Waste” management
  - Activated mercury returned to ORNL
  - Solenoid shipped to Japan
    - considered for further use
  - Power supply goes with solenoid
  - Mercury loop reused in Japan/US?
  - ...

Summary

► Integration of experiment technically possible!
  ▪ No safety obstacles

► DG approval needed ...