**PETRA III extension: Beamline P65**

**Beamline specifications:**
- Millimetre sized beam spot on sample
- No focusing mirrors
- Short 11 periods undulator source
- Photon flux \( > 10^{11} \) s
- Energy range: 4 – 44 keV
- Easy to handle standard operating procedures for inexperienced users
- Complementary to P64 (see poster by W. Caliebe et al.)
- Large experimental (2.5 \( \times \) 2 m²) table with standard EXAFS set-up
- Ample space for specialised in-situ set-ups
- Infrastructure for problematic gases
- Temperature stabilised to +/− 1° C
- Detectors: Ionisation chambers, PIPS, energy-dispersive semi-conductor detectors
- Sample preparation lab shared with beamline P64.
- Sample preparation lab (shared with P64).
- Fume hut, glove box, lab benches and equipment for sample preparation like an analytical balance and pellet press

**Timeline**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tr>
<td>2013</td>
<td>PETRA III shutdown</td>
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<td>2014</td>
<td>Modification ring tunnel</td>
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<td>2015</td>
<td>Installation of machine</td>
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<td>2016</td>
<td>Machine commissioning</td>
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<td>2016</td>
<td>Civil engineering hall north</td>
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<td>2016</td>
<td>Set-up optics hutch</td>
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<td>2016</td>
<td>Set-up optics</td>
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<td>2016</td>
<td>Set-up experiment</td>
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<td>2016</td>
<td>Installation of front end</td>
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<td>2016</td>
<td>Installation of undulator</td>
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<td>2016</td>
<td>Set-up experiment</td>
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<td>2017</td>
<td>First user activities*</td>
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<td>2017</td>
<td>Inst. of tech. infrastructure</td>
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<tr>
<td>2017</td>
<td>Beamline commissioning</td>
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<tr>
<td>2017</td>
<td><strong>NOT</strong> normal user operation!</td>
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</tbody>
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**Main parameter:**
- Source: Short 11 periods undulator
- 2 plane mirrors for higher harmonics rejection and power load reduction
- Water cooled C-type double crystal monochromator (DCM)
- Short distance between DCM and sample for improved stability

**Source:**
- Period length: 32.8 mm
- Number of periods: 11
- Minimum magnetic gap: 9.5 mm
- \( K_{\text{min}} \): 2.7 (magnetic gap 10.05 mm)
- Undulator gap and DCM will be scanned in a continuous mode, the anticipated times per scan are between 1 and 5 min.
- DCM and undulator gap scans will be synchronised
- Synchronised gap scans already successfully tested at beamline P06, deviation between undulator and DCM energy < 2 eV at 9 keV

**Double crystal monochromator:**
- Water cooled
- Si 111 and 311 crystal pairs (2.4 – 44 keV)
- Maximum acceptable power load: 2 W / mm²
- Power load limits tested during measurements in September/October 2012 at DORIS III beamline BW1
- Renishaw encoder on the Bragg-axis

**Mirrors:**
- 2 plane mirrors
- 3 optical surfaces each (Si, Rh, Pt)
- Variable angle of incidence, 1.5 – 4.5 mrad for effective higher harmonics suppression
- First mirror (water cooled) acts as low pass filter to reduce power load of 1° DCM crystal

**CAD-drawing of PEX beamline P65, (1) experimental hutch, (2) control hutch, (3) sample preparation lab (shared with P64)**

**In short:**
- Start of regular user operation February 2016
- Schedule determined by experimental and optics hutch construction
- Beamline design phase finished
- Mirrors and undulator delivered
- Double crystal monochromator currently re-assembled, will undergo final (final successful) vacuum test in February 2015