Preparation for ZZ and recovery after access

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HELMHOLTZ



Topics

- Magnet current during ZZ
- ZZ Injector
- Restart Injector after ZZ
- 🔶 ZZ XTL
- Restart XTL after ZZ
- ZZ XTD-1-3-4-7-
- Restart XTD-1-3-5-7 after ZZ
- ZZ XTD-2-4-10-
- Restart XTD-2-4-10- after ZZ
- ZZ and Restart XTD6 and XTD9
- Useful hints



Magnet current during ZZ

- Before ZZ with magnets under current, MXL or RCs make a safety audit to ensure that there is no work near the beam pipe
- Point out to the colleagues who enter the tunnel that the magnet current is on
- Also the shift leaders should point that out while the ZZ team enters the ZZ door
- Under this conditions ZZ with magnets under current and without attendance of MKK colleagues is permitted
- Injector and XTL all magnet connections are covered
- XTD1-3-5-7 and XTD2-4-10 not every magnet connection is covered sufficiently
 - In XTD1-3-5-7 and XTD2-4-10 using a bike with magnets under current is prohibited



ZZ areas

- Injector
- 🔶 XTL
- XTD1-3-5-7 (SASE2 branch)
- XTD2-4-10 (SASE1 branch)
- XTD6 (SASE2 Photon tunnel)
- XTD9 (SASE1 photon tunnel)
- XTD8 (empty tunnel)





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ZZ Injector

- Save a file (sequencer)
- Close beam shutter BS I1
- Switch of RF
 - GUN
 - A1 and AH1 (with energy manager)
 - Injector TDS (uncheck RF on/off)
- In case of work near beam pipe, switch off and ground magnets
 - Use 'Magnet overview' panel to switch off magnets and ask MKK for grounding (also Dump dipole will be switched off, no effect on XTL beam permission
- Delete beam permission





Restart Injector after ZZ

- Ask MKK to unground magnets
- Switch on magnets and load file values
- Start Beam warning Injector
- Open beam shutter BS I1
- Grant beam permission
- Switch on RF
 - GUN (see training "GUN operation")
 - A1 and AH1 with energy manager
 - Injector TDS

XFEL.xml tine:XFEL///De Strahlfreigaben Magnetstromfreigaben / HF-Freigaben / Türeninterlock / NOT-AUS / Schlüsselkästen XFEL Strahlfreigaben SASE2 -XTD1-3-5-7-XTD3 XTD5 XTD7 SASE4 -XTL-SASE -Injektor1-XTD10 rün - Strahlfreigabe erteilt / Beamshutter offer BS I1 XTL Strahlfreigab BS I1 öffn 🗸 BS I1 öffnen BS I1 schliesse 🗸 BS I1 offen 🗙 BS I1 geschlossen X & ≥1 \mathbf{X} & 🗸 XTL sicher_---- 🗸 Injektor1 Strahlfreigabe BS I1 geschlosse ≥1 L Strahlungs logbook DE default view HIDDEN EN

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ZZ XTL

Save a file

- Use sequence "Separate Injector from XTL" to keep Injector running
- Shut down RF by using "Linac Energy Manager"
- Shut down TDS B2 (press STBY)
- In case of work near beam pipe, switch off and ground magnets
 - Use 'Magnet overview' panel to switch off magnets by clicking on each section and press Switch off
 - Ask MKK for grounding
- Switch off orbit- and longitudinal feedbacks





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ASSOCIATION

Restart XTL after ZZ

- Unground magnets
- Switch on magnets and load file
- Cycle all main magnets
- Ask Shift leader for beam permission
- Restart RF using the 'Linac Energy Manager'
 - See training "LLRF"
- Use sequence "Join Injector with XTL"
- Use corrector CBB.62.I1D to correct orbit and re-establish transmission
- Switch on orbit FBs to re-establish transmission
- Switch on longitudinal FBs successively



ZZ XTD1-3-5-7 (South branch SASE2)

- Save a file
- Use sequence "Separate SASE2 from XTL"
- In case of work near beam pipe, switch off and ground magnets
 - Use 'Magnet overview' panel to switch off magnets by clicking on each section and press Switch off
 - Ask MKK for grounding

A XFELMainTaskbar.xml _ 🗆 🗙 \times European Ort -0000-Vacuum Cryo Controls XFEL MPS Magnets S Operation Tools Sequences Interlocks Cockpit Sequencer Join injector with XTL Personnel Interlock Sequencer-separate_xtl_sase2.xml XFE File Edit View Options Help SEQUENCE: Separate SASE2 from XTL XFEL Filename: separate xtl sase2.xml Sequencer Contro CLOSE window STOP sequence STATUS: idle START sequence User Parameters Close valve: yes 👻 Documentation enable descriptior status remarks restore check user actions 1 Switch off special grounding magnets 6 data 6 data XEEL V XFEL MAGNET OVERVIEW Cycling: show hide Magnet groups for entire beamlines (gun to dump) Gun-G1D Gun-I1D Gun-B1D Gun-B2D Gun-TLD Gun-T4D Gun-T5D MAG_I1D SOLA.23.11 SOLB.23.I1 OLN 23 11 OLS 23 11 CKX 23 I1 CKY.23.I1 CKX.24.I1 CKY.24.11 CKX.25.I1 CKY.25.11 Q 37 I CY.37.I1 ON Switch Off lumber of r 0.2002 1 0.01 rad/m 0.01 rad/i 0.725 mra 0.882 mrad 0.707 mra 0.670 mra 0.023 mrac 0.003 mr 0.408 mr 333.70 A 1.78 A 24.10 A 0.27 A 0.53 A 1.93 A 2.34 A 1.88 A 0.06 A 0.01 A -2.22 A V AII OK All Magnets Some/all off Dirty Magnets Cycling needed All Main Magnets 🗸 All idle

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Restart XTD1-3-5-7 after ZZ

- Use sequence "Join SASE2 with XTL"
- Cycle special grounded magnets
- In case magnets were grounded, unground, switch on and reload file and cycle main magnets
- Switch on orbit FB to re-establish transmission (maybe load orbit from saved file before)

XFEL.xml tine:XFEL///De _ 🗆 🗙 Strahlfreigaben Magnetstromfreigaben HF-Freigaben Türeninterlock NOT-AUS Schlüsselkästen ZZ -XTD6-XFEL Strahlfreigaben SASE2 -XTD1-3-5-7- XTD1 XTD3 XTD5 XTD7 SASE4 BS TD \diamond -XTD8-SASE5 -XTL--XTD9-SASE1 -Injektor1-XTD4 XTD2-4-10-XTD10 SASE3 grün - Strahlfreigabe erteilt / Beamshutter offer BS TD1 BS TD1 öffne Strahlfreigabe XTD1-3-5-7 - 🗸 BS TD1 öffnen File Edit View Options Help VTTI SEQUENCE: Join SASE2 and XTL XFEL Mag InterlockSwitches.xml /// T1/T2 SPECIAL MAGNET GROUNDING XFEL STATUS: idle CLOSE window T1 Opecial Grounding for XTD1 Access IIII Use sequences instead of this panel IIII tatus remarks restore check user actions 1 data blocked (magnets not grounded) 2 data 2 data Ground Magnets (Permit Access) Unground Magnets (Block Access) 1 data 1 data 1 data BD.2077.T1 BD.2079.T1 BD.2080.T1 BD.2082.T1 Circuit BD.1.T1: 🗙 6 data QF.2083.T1 X 6 data 6 data Circuit BD.3.T1: X BD.2084.T1 1 data 1 data D.4.T1: 🗙 BD.2097.T1 Circuit QF.7.T1: X QF.2098.T1 Circuit QF.8.T1: 🗙 QF.2110.T1 T2 Special Grounding for XTD2 Access 🗙 Access blocked (magnets not grounded) Ground Magnets (Permit Access) Unground Magnets (Block Access) Circuit QF.1.T2: X QF.2072.T2 QF.2087.T2 QF.2102.T2 QF.2117.T2 QF.2132.T2 Circuit BD.10.T2: 🗙 BD.2079.T2 BD.10.T2 > I_mir



ZZ XTD2-4-10 (North branch SASE1/3)

- Save a file
- Use sequence "Separate SASE1/3 from XTL"
- In case of work near beam pipe, switch off and ground magnets
 - Use 'Magnet overview' panel to switch off magnets by clicking on each section and press Switch off
 - Ask MKK for grounding

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Restart XTD2-4-10 after ZZ

- Use sequence "Join SASE1/3 with XTL"
- Cycle special grounded magnets
- In case magnets were grounded, unground, switch on and reload file and cycle main magnets
- Switch on orbit FB to re-establish transmission (maybe load orbit from saved file before)

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ZZ XTD6 and XTD9

- No magnets in this areas
- For ZZ in XTD6 close BS TD6
- For ZZ in XTD9 close BS TD9





Useful hints

Beam warning, as requirement for beam permission, for all interlock section **except** the injector, can only be given when all interlock keys are locked

MALE XFEL.xml tine:XFEL///D

-Injektor1-

-Injektor1-

default view HIDDEN

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Useful hints

Media shaft XSIN can be entered without breaking the injector interlock via door in UG4 with additional keys at Injector BKR interlock rack

European XFEL



Injektor 1 6) Schlüs



