

CHES Compact Undulator Test Plan

Time table

Feb 15-22, CHES run start up (can use ~30% time)

Feb 26 – Mar 20, CHES regular run (Tuesday's MS, few hours)

Apr 18, Recover after CTA run (two shifts)

Apr 19-20, Undulator installation

Apr 21- May 22, Undulator running

Feb 15 – 22, CHESS Run start up.

Optics development:

Plan “A”

Recover conditions from 2011-05-31 MS, Optics CHESS_UND_HIBETA_20110511. This optics has $\sim 72\text{m}$ β_y at 43E/W vertical scraper locations. Scrapers can be used for the both electron and positron injected beam collimation. Collimation is needed to protect undulator from high energy particles radiation.
Check/fix closed bumps

Correct orbit/phase/coupling. Tune e^+/e^- injection with scrapers in.

Plan “B”

Continue development of the latest optics chess_und_20111114, see MS 2011-11-15. This optics has high β only at 13W mask location. That provides undulator protection only for electron beam. We can not work with positron beam in this optics.

Correct orbit/phase/coupling. Tune e^+ injection with mask in

Feb 15 – 22, CHESS Run start up.

Top-up operation

Check operation of beam orbit correction during injection for both e+ and e- beams. For beam orbit position monitoring use “libear” 10Hz measurement mode.

Plan “A”: Establish top-up operation in CHESS_UND_HIBETA_20110511 optics for both e+/e- beams with 43E/W scrapers in.

Plan “B”: Establish top-up operation in chess_und_20111114 optics for e- beam with 13W mask in.

Feb 15 – 22, CHESS Run start up.

Instrumentation

1. Check polarities of sextupole magnets.
2. Start using the second “libera” electronics unit (cabling, programming, communication with control system and etc.)
3. Check operation of undulator radiation protection monitors.
Measure radiation dose rate around 8W
 - a) with/without scarpers/masks
 - b) in regular and top-up operation modes
3. Check undulator protection interlock for :
 - c) Radiation
 - d) Orbit change
 - e) Temperature
 - f) Vacuum

Feb 15 – 22, CHESS Run start up.

At the end of this period we should have

1. Established conditions for both e^+/e^- beams with top-up
2. Made standard characterization for e^+/e^- conditions
3. Functional undulator protection interlock
4. Functional precise beam orbit monitoring with two libera units.

Feb 26 – Mar 18, CHESS regular Run.

1. Each Tuesday MS load and recover established conditions for both e⁺/e⁻ beams, check potential problems (PS, pulse elements timing drifts and etc.)
2. Work on loosen ends

Apr 17 – Apr 18, Condition recover after CTA run

1. Recover e+/e- undulator conditions
2. Check top-up operation
3. Check CHESS beam-lines alignment?

Apr 18, Undulator installation

1. Radiation monitors
2. Interlock
3. BMPs
4. Driver control & position monitor
5. Undulator corrector power supplies (3PSs $\pm 12A$)
6. X-ray pin hole camera?

Apr 20 - ???, Beam operation

1. Inject small single e- bunch ($\sim 1\text{mA}$) with scrapers in and undulator in a max field position.
2. Measure & correct orbit/phase/coupling using nearby elements.
3. Gradually move magnet array in “OFF” position, observe orbit/phase/tune/coupling response.
4. In “ON” position check the presence of x-ray beam in CHESS A-line, align position.
5. In “OFF” position increase beam current to 10mA (add more bunches). Watch radiation, temperature, vacuum. See if we need beam processing and etc.
6. Continue with beam current increase up to 250mA (171bunches X 1.25mA)
7. Repeat 5 and 6 with undulator in “ON” stage.

Depending on situation we may switch to positron beam and proceed through 1.-7. or give time to CHESS to start working with x-rays.

Apr 20 - ???, Beam operation

After 2-3 days of the beam dynamics and machine conditions exploring we may start regular CHESS run.

Duration of e^+/e^- beam runs will be defined based on the machine condition, demand from CHESS scientists, made progress and etc.