

High-beta optics

Several High-beta options

- IR5 Totem optics $\beta^* \sim 1540$ m
- early Totem optics or "diffractive" $\beta^* \sim 90$ m
- IR1 Atlas high- β , $\beta^* \sim 2540$ m

status and follow up

Totem

1) Totem optics (IR5)

Status:

$\beta^* = 1535$ m optics files available /afs/cern.ch/eng/lhc/optics/V6.5/Totem/

Documented :

A. Verdier, "TOTEM Optics for LHC V6.5." CERN-LHC-Project-Note-369.- 13 May 2005.

Q8R5 at max, Q7L5 at minimum strength at 7 TeV

Tunes:

$Q_x = 64.32$, $Q_y = 58.31$ fractional part adjusted using IR4

different integer part ! ,

(standard LHC V6.5 injection $Q_x = 64.28$; $Q_y = 59.31$ collision $Q_x = 64.31$; $Q_y = 59.32$)

Follow up :

will need intermediate files for "un"squeeze from injection to high β^* , knobs (Q, Q')
and full commissioning of injection + ramp + "un"squeeze

2) early Totem optics or "diffractive" $\beta^* \sim 90$ m

Status

Files: So far nothing official in database.

Working files from Valentina Avati and Andre Verdier ~vrd/group/lhc/05/totem/diffraction/kdfb90

Not too far from standard optics - Same integer tunes.

Appears to be currently favored by Totem for a first run (in 2007/2008 ?)
and approximate Luminosity determination.

High beta (>1000m) anyway planned later for high precision elastic cross section and Lumi

Known issue (Werner Herr) at 90m : separation bumps, correctors at the limit, parasitic beam-beam
25ns excluded, 75ns correctors at the limit,
Ok with 156 or fewer bunches

Follow up :

intermediate files, demonstration that smooth path from standard injection or rather end of ramp
optics to 90m is possible, knobs, ...

- IR1 Atlas high- β , $\beta^* \sim 2540$ m

Status, to my knowledge (confirmed last week by A.V.):

No support from us so far (no documentation, files, instructions on this from A. Verdier)

Some previous work by A. Faus - Golfe

Thys recently copied `/afs/ific.uv.es/user/a/afaus/public/atlas/` files to
`/afs/cern.ch/eng/lhc/optics/V6.5/HiBeta`

These files are in fact for IR5 (supposed to be \sim same as IR1).

My conclusion at this stage (for discussion) :

Consistent approach and follow up for high- β files needed.

Aim:

- full set of files and tools (knobs) from injection to high- β as for standard optics
- sample jobs and documentation
- discussed and agreed with experiments based on physics requirements - like roman pot position, lumi, precision and machine strength, aperture, separation constraints (and if possible close to earlier work)

Timescale ? Priority ? (1st 90m Totem ?), 2nd Atlas ?