

Note on Transverse Collimator Positions

1 Alignment Baseline

The collimators which have a single beam inside (all collimators installed in 2006/2007) are aligned to the collimated beam.

2 Transverse Collimator Positions

The transverse coordinates of the collimators in the transition regions are summarised in table 2. In these transition regions the half distance of the two beam lines decreases from 0.097 m to 0.00 m (both beams in same beam pipe) in the experimental insertions or increases from 0.097 m to 0.112 m in warm section of IR3 and IR7. The values are extracted from the *LHC* optics version 6.501 using the corresponding *MADX* sequence. The used scripts are shown in section 5.

Name	x_{start} [mm]	x_{center} [mm]	x_{end} [mm]
TCTVA.4R1.B2	-82.548	-83.384	-84.219
TCTH.4R1.B2	-84.445	-85.280	-86.115
TCTH.4L2.B1	85.613	84.479	83.345
TCTH.4R2.B2	83.345	84.479	85.613
TCLA.6L3.B2	101.213	101.632	102.050
TCP.6L3.B1	-102.346	-102.764	-103.182
TCP.6R3.B2	103.096	102.678	102.260
TCLA.6R3.B1	-101.964	-101.546	-101.127
TCTH.4L5.B1	-86.115	-85.280	-84.445
TCTVA.4L5.B1	-84.219	-83.384	-82.548
TCTVA.4R5.B2	-82.548	-83.384	-84.219
TCTH.4R5.B2	-84.445	-85.280	-86.115
TCP.D6L7.B1	99.480	99.762	100.043
TCP.C6L7.B1	100.235	100.517	100.798
TCP.B6L7.B1	100.990	101.272	101.553
TCLA.B6L7.B2	-107.098	-107.378	-107.657
TCLA.B6R7.B1	107.657	107.378	107.098
TCP.B6R7.B2	-101.553	-101.272	-100.990
TCP.C6R7.B2	-100.798	-100.517	-100.235
TCP.D6R7.B2	-100.043	-99.762	-99.480
TCTH.4L8.B1	85.613	84.479	83.345
TCTH.4R8.B2	83.345	84.479	85.612
TCTH.4L1.B1	-86.115	-85.280	-84.445
TCTVA.4L1.B1	-84.218	-83.383	-82.547

Table 1: Transverse collimator positions, x-coordinate is given at the beginning, the middle and the end of the vacuum tank. The coordinates are given in the reference frame of beam 1 (to be confirmed), see figure 1

3 Reference Frame

The definition of reference frame used by the simulation tools (*MADX and Six-Track*) is shown in figure 1. Beam 1 goes clockwise and beam 2 counter-clockwise. The positive x-axis for beam 1 points from the ring outside, whereas for beam 2 it points inside. The azimuthal angle defining the rotation of an element (collimator) starts from the positive x-axis and is measured clockwise in the x-y plane.

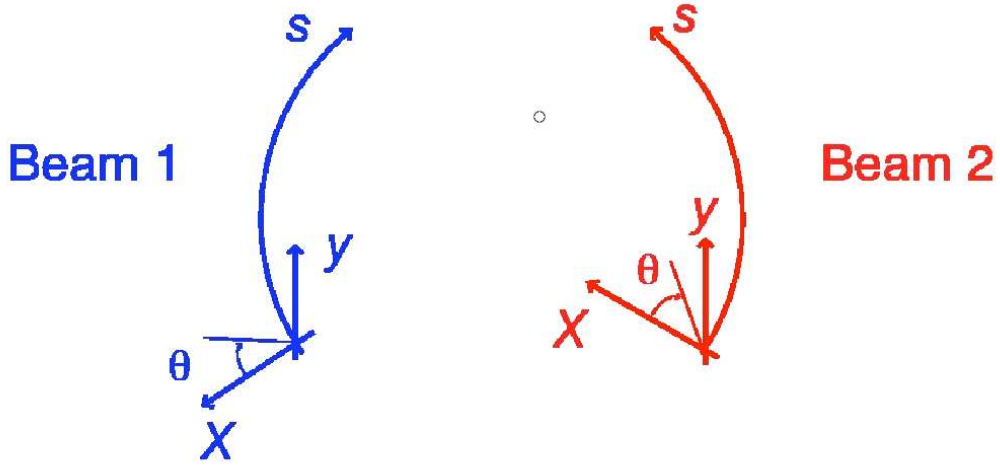


Figure 1: Definition of the reference frames used by the simulation tools (*MADX and Six-Track*)

4 Issues

Passive absorbers and scrapers are excluded from the table 2 (they are phase 2 anyway). These are:

TCDD.4I2	TCHSH.6L3.B1	TCLAP.6L3.B1	TCLAP6R3.B2
TCHSH.6R3.B2	TCHSV.6L7.B1	TCHSH.6L7.B1	TCLAP.6L7.B1
TCLAQ.6L7.B1	TCLAQ.6R7.B2	TCLAP.6R7.B2	TCHSH.6R7.B2
TCSHV.6R7.B2			

Table 2: Passive absorbers and scrapers (*phase 2*) in transition regions, which are not considered in table 2

5 MADX-Scripts

5.1 Beam1

```
! TW, 26-09-2006
! Update to the optics version V6.501

REAL CONST DS = 0.0 ;      // to switch the path length diff OFF
REAL CONST A.MB = 0 ;      // to switch main magnets OFF
!REAL CONST RO  = 1 ;      // to switch separation magnets OFF
!REAL CONST l.MBX = 0.00001; // D1 IP2, IP8
!REAL CONST l.MBXW = 0.00001; // D1 IP1, IP5
!REAL CONST l.MBRC = 0.00001; // D2 IP1,2,5,8
!REAL CONST l.MBRS = 0.00001; // D3 IP4
!REAL CONST l.MBRB = 0.00001; // D4 IP4
!REAL CONST l.MBW = 0.00001; // D3, D4 IP3, IP7
!REAL CONST AIP3 = 0.0;

set,format="11.6f";
option, -echo,-info,warn;
system,"ln -fns /afs/cern.ch/eng/lhc/optics/V6.501 db";
call, file = "db/V6.501.seq";
! call, file = "db/V6.501.inj.str";

system,"rm db";
seqedit,sequence=lhcb1;
flatten;
endedit;

option, echo, info, warn;
Beam, particle = proton, sequence=lhcb1, energy = 450.0,
      bv = 1; NPART=1.05E11, sige= 4.5e-4 ;

on_x1 := 0; on_x2 := 0; on_x5 := 0; on_x8 := 0;
on_sep1 := 0; on_sep2 := 0; on_sep5 := 0; on_sep8 := 0;

use, period=lhcb1 ;
select, flag=survey, column=name,s,x,y,z;
select, flag=survey, clear;
survey,sequence=lhcb1,file="LHC_survey.dat";
stop;
```

5.2 Beam2

```
! TW, 26-09-2006
! Update to the optics version V6.501
```

```

REAL CONST DS = 0.0 ;      // to switch the path length diff OFF
REAL CONST A.MB = 0 ;     // to switch main magnets OFF
!REAL CONST RO  = 1 ;     // to switch separation magnets OFF
!REAL CONST l.MBX = 0.00001; // D1 IP2, IP8
!REAL CONST l.MBXW = 0.00001; // D1 IP1, IP5
!REAL CONST l.MBRC = 0.00001; // D2 IP1,2,5,8
!REAL CONST l.MBRS = 0.00001; // D3 IP4
!REAL CONST l.MBRB = 0.00001; // D4 IP4
!REAL CONST l.MBW = 0.00001; // D3, D4 IP3, IP7
!REAL CONST AIP3 = 0.0;

set,format="11.6f";
option, -echo,-info,warn;
system,"ln -fns /afs/cern.ch/eng/lhc/optics/V6.501 db";
call, file = "db/V6.501.seq";
! call, file = "db/V6.501.inj.str";
!
system,"rm db";
seqedit,sequence=lhcb2;
!reflect;
flatten;
endedit;

option, echo, info, warn;
Beam, particle = proton, sequence=lhcb2, energy = 450.0,
      bv = -1, NPART=1.05E11, sige= 4.5e-4;
!
on_x1 := 0; on_x2 := 0; on_x5 := 0; on_x8 := 0;
on_sep1 := 0; on_sep2 := 0; on_sep5 := 0; on_sep8 := 0;

use, period=lhcb2 ;
select, flag=survey, column=name,s,x,y,z;
select, flag=survey, clear;
survey,sequence=lhcb2,file="LHC_survey.dat";

stop;

```