Crossing issues (in collision !)

■ **Crossing angles in IP8**

➤ Different β^*: (1m, 2m, 10m)

➤ Is there a prefered polarity of the spectrometer magnet ?

➤ Are all β^* possible with standard parameters ?

■ **Issues for IP8**

➤ Corrector strength limitations

➤ Required beam separation

➤ Aperture

■ **Running scenarios with different β^* (under study)**

Spectrometer (flag)	$\beta^*_{x,y}$ (m)	spectrometer angle (b1) (μrad)	half external angle (b1) (μrad)	half crossing angle (b1) (μrad)
on_lhcb $= -1$	10.0 m	-135.0	-65.0	-200
on_lhcb $= +1$	10.0 m	$+135.0$	-210.0	-75
on_lhcb $= -1$	2.0 m	-135.0	-125.0	-260
on_lhcb $= +1$	2.0 m	$+135.0$	-210.0	-75
on_lhcb $= -1$	1.0 m	-135.0	-150.0	-285
on_lhcb $= +1$	1.0 m	$+135.0$	-255.0	-120

Strengths for $\beta^* = 2$ m

```
! crossing angle of 125 murad, IP8 with beta* 2m
! made for on_lhcb = -1;
! for other polarity: scale on_x8*(210./125.);
!
acbxh1.l8 := -3e-05*on_x8;
acbxh1.r8 := 3e-05*on_x8;
acbxv1.l8 := 8e-06*on_sep8;
acbxv1.r8 := 8e-06*on_sep8;
acbyhs5.l8b1 := 2.327659779e-05*on_x8;
acbyhs4.l8b1 := 1.319390218e-05*on_x8;
acbyhs4.r8b1 := -3.55899749e-05*on_x8;
acbyhs5.r8b1 := -8.714060523e-06*on_x8;
acbyvs5.r8b1 := -8.824255694e-06*on_sep8;
acbyvs4.l8b1 := 7.426485135e-06*on_sep8;
acbyvs4.r8b1 := 2.214511095e-05*on_sep8;
acbcv6.l8b1 := -1.21122823e-06*on_sep8;
!
acbxh1.l8 := -3e-05*on_x8;
acbxh1.r8 := 3e-05*on_x8;
acbxv1.r8 := 8e-06*on_sep8;
acbxv1.l8 := 8e-06*on_sep8;
acbyhs5.l8b2 := -1.064901694e-05*on_x8;
acbyhs4.l8b2 := -3.565113165e-05*on_x8;
acbyhs4.r8b2 := 1.621989609e-05*on_x8;
acbyhs5.r8b2 := 2.220267005e-05*on_x8;
acbyvs5.l8b2 := 9.100878732e-06*on_sep8;
acbyvs4.l8b2 := -2.325416841e-05*on_sep8;
acbyvs4.r8b2 := -7.518384021e-06*on_sep8;
acbcv6.r8b2 := 1.200021185e-06*on_sep8;
!
```

Strengths for $\beta^* = 1$ m

```
! crossing angle of 150 murad, IP8 with beta* 1m
! made for on_lhcb = -1;
! for other polarity: scale on_x8*(255./150.);
!

acbxh1.l8 := -3e-05*on_x8;
acbxv1.l8 := 8e-06*on_sepx8;
acbxh1.r8 := 3e-05*on_x8;
acbxv1.r8 := 8e-06*on_sepx8;

acbyhs5.l8b1 = 3.699723914e-05*on_x8;
acbyhs4.l8b1 = -7.173927481e-07*on_x8;
acbyhs4.r8b1 = -2.797620256e-05*on_x8;
acbyhs5.r8b1 = -2.706917206e-05*on_x8;
acbcv6.l8b1 = -1.2266763e-06*on_sepx8;
acbyvs4.l8b1 = 7.313543557e-06*on_sepx8;
acbyvs4.r8b1 = 2.18607864e-05*on_sepx8;
acbyvs5.r8b1 = -8.757570081e-06*on_sepx8;

acbyhs5.l8b2 = -2.849012144e-05*on_x8;
acbyhs4.l8b2 = -3.021075084e-05*on_x8;
acbyhs4.r8b2 = 4.722139242e-06*on_x8;
acbyhs5.r8b2 = 3.531165463e-05*on_x8;
acbyvs5.l8b2 = 9.052049198e-06*on_sepx8;
acbyvs4.l8b2 = -2.309268922e-05*on_sepx8;
acbyvs4.r8b2 = -7.483083828e-06*on_sepx8;
acbcv6.r8b2 = 1.195217302e-06*on_sepx8;
```

Optics requirements (here: CMS)

Physics	high luminosity	low $\mid t \mid$ elastic sc.	high $\mid t \mid$ elastic sc.	min.bias, diffraction	hard diffractio
β^* (m)	0.55	1540	≈ 20	1540	100 - 20
Bunches	2808	43 or 156	2808	156	2808
Angle (μrad)	300	0	300	0	300
N_p (10^{11})	1.15	0.3	1.15	$\leq$ 1.15	1.15
ϵ^* (10^{-6})	3.75	1.0	3.75	$\leq$ 3.75	3.75