

Crossing and orbit corrections

without **MCBCH.B5L8.B1**

W. Herr

Corrector layout near Q5 left, beam 1

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MCBCH.B5L8.B1:MCBCH,

AT= -175.742+(154-IP8OFS.B1)*DS, from= IR8;

MCBCV.5L8.B1:MCBCV,

AT= -174.595+(154-IP8OFS.B1)*DS, from= IR8;

MCBCH.A5L8.B1:MCBCH,

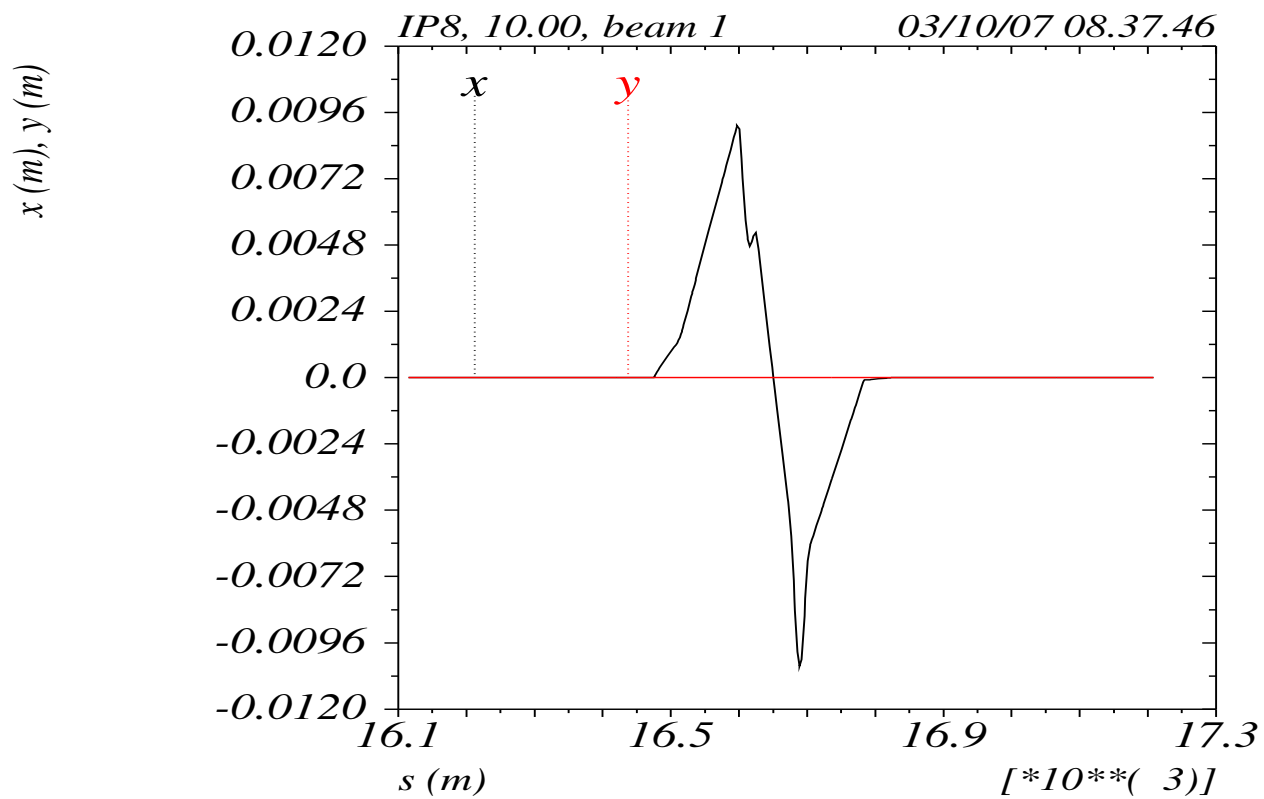
AT= -173.449+(154-IP8OFS.B1)*DS, from= IR8;

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Present crossing scheme



Present crossing scheme

corrector (kick)	maximum (4.5 K)	present	percentage
acbyhs4.l8b1	96 μrad	17.9 μrad	$\approx 19\%$
acbchs5.l8b1	90 μrad	44.4 μrad	$\approx 50\%$
acbyhs4.r8b1	96 μrad	75.7 μrad	$\approx 80\%$
acbyhs5.r8b1	96 μrad	2.0 μrad	$\approx 2\%$
acbxh1.8	65 μrad	$\pm 6.0 \mu\text{rad}$	$\approx 10\%$

■ All backed up with orbit correctors

■ **MCBCH.B5L8.B1** \rightarrow **MCBCH.A5L8.B1**



Present usage

MCBC (at 7 TeV):

4.5K, $L \approx 0.9$ m, 2.33 T, kick $\approx 90 \mu\text{rad}$

Presently for crossing angle ($210 \mu\text{rad}$): **MCBCH.B5L8.B1**
with $\approx 45 \mu\text{rad}$

(i.e. "bad" polarity of LHCb spectrometer)

Also used for: beam adjustment (parallel bump), orbit correction

If replaced by **MCBCH.A5L8.B1** limits severely orbit correction and collision adjustment :

IP offset 1 mm *or* 1.2 mm of Q5 doublet



Alternatives

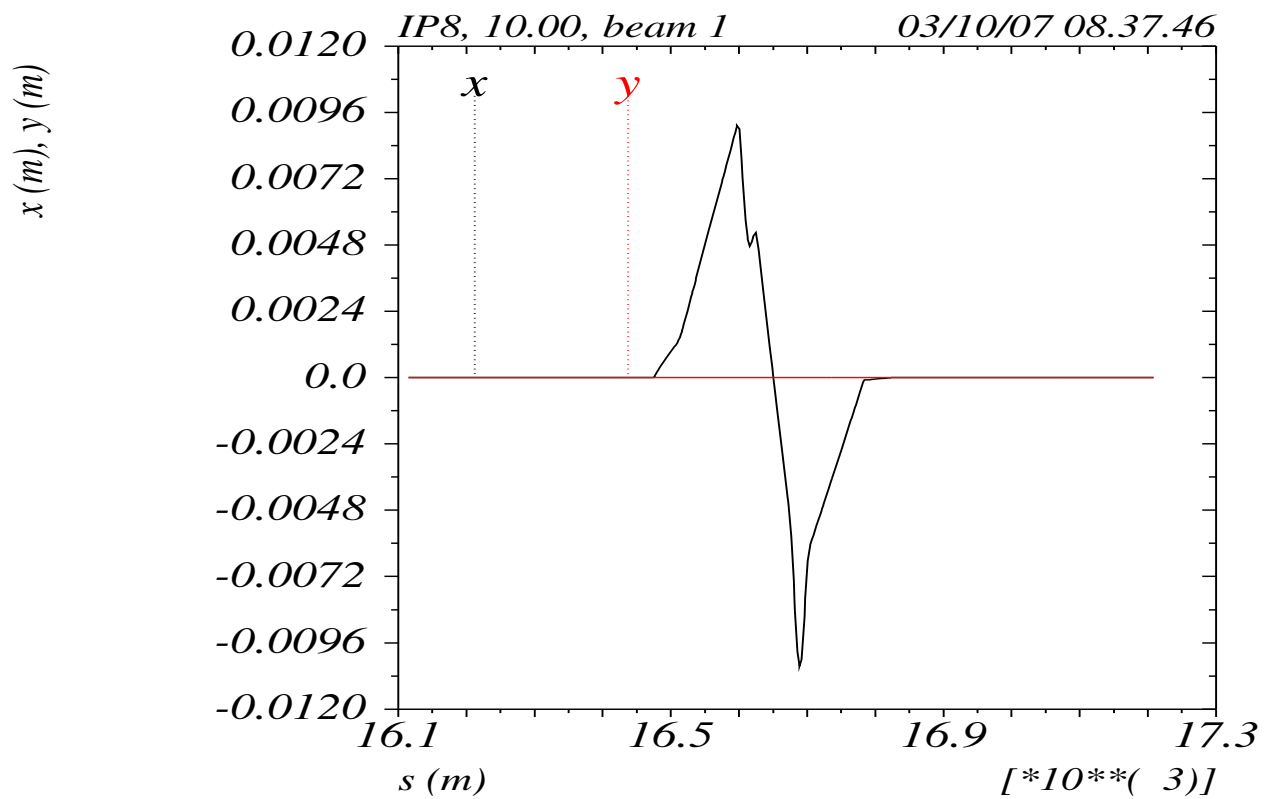
- Repair or temporary substitute
 - Share between **MCBCH.A5L8.B1** → **MCBCH.7L8.B1**
 - Avoids double crossing (H-plane separation in IP8 !)
 - Limit **MCBCH.A5L8.B1** to $\approx 20 - 25\%$ of maximum strength
 - Allow **MCBCH.7L8.B1** for $\approx 25\%$ of maximum strength
 - Questions: other correctors, aperture ?
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Modified crossing scheme

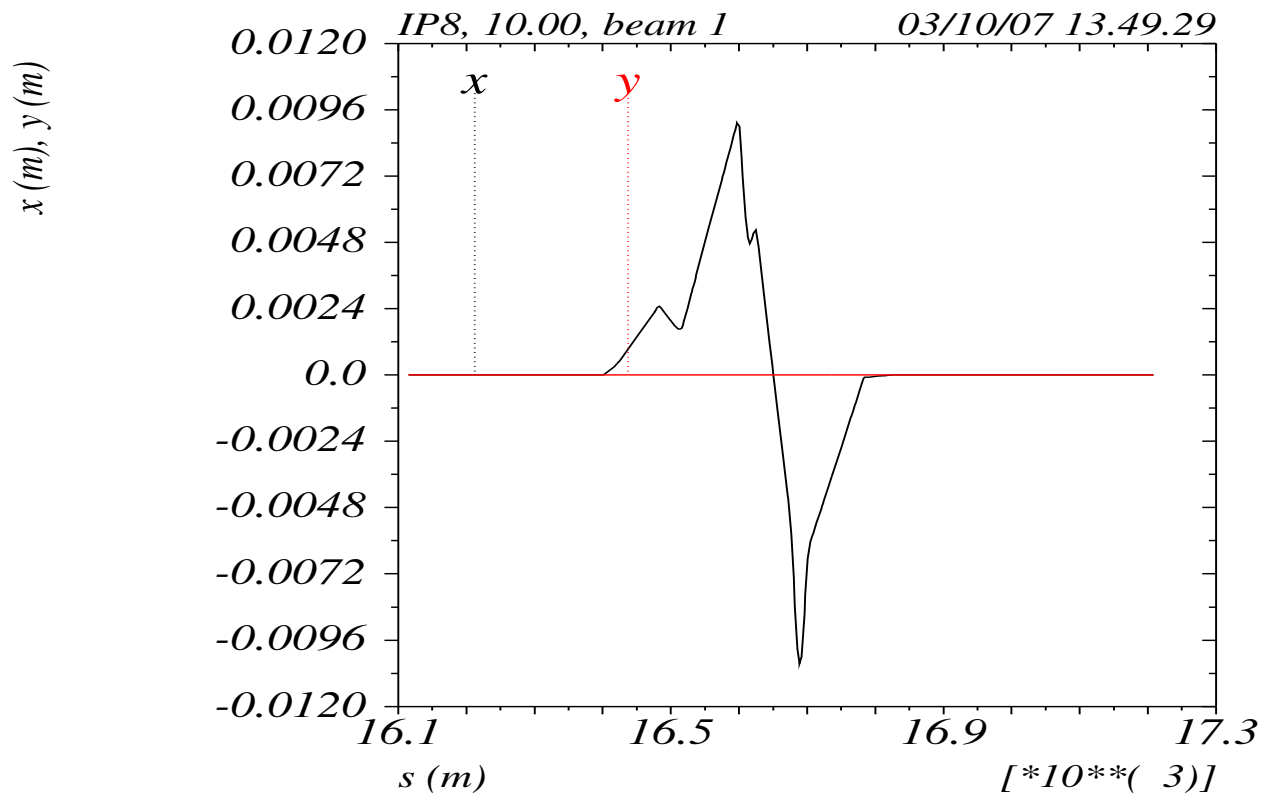
corrector	maximum (4.5 K)	present	percentage
acbyhs4.l8b1	96 μ rad	74.8 μ rad	\approx 78%
acbch5.l8b1	90 μ rad	22.5 μ rad	\approx 25%
acbch7.l8b1	90 μ rad	19.6 μ rad	\approx 22%
acbyhs4.r8b1	96 μ rad	75.7 μ rad	\approx 80%
acbyhs5.r8b1	96 μ rad	2.0 μ rad	\approx 2%
acbxh1.8	65 μ rad	\pm 6.0 μ rad	\approx 10%



Present crossing scheme



Possible alternative crossing scheme ($\beta^* = 10\text{m}$)



Possible alternative crossing scheme ($\beta^* = 1\text{m}$)

