Injector Upgrade Optics - elegant Model

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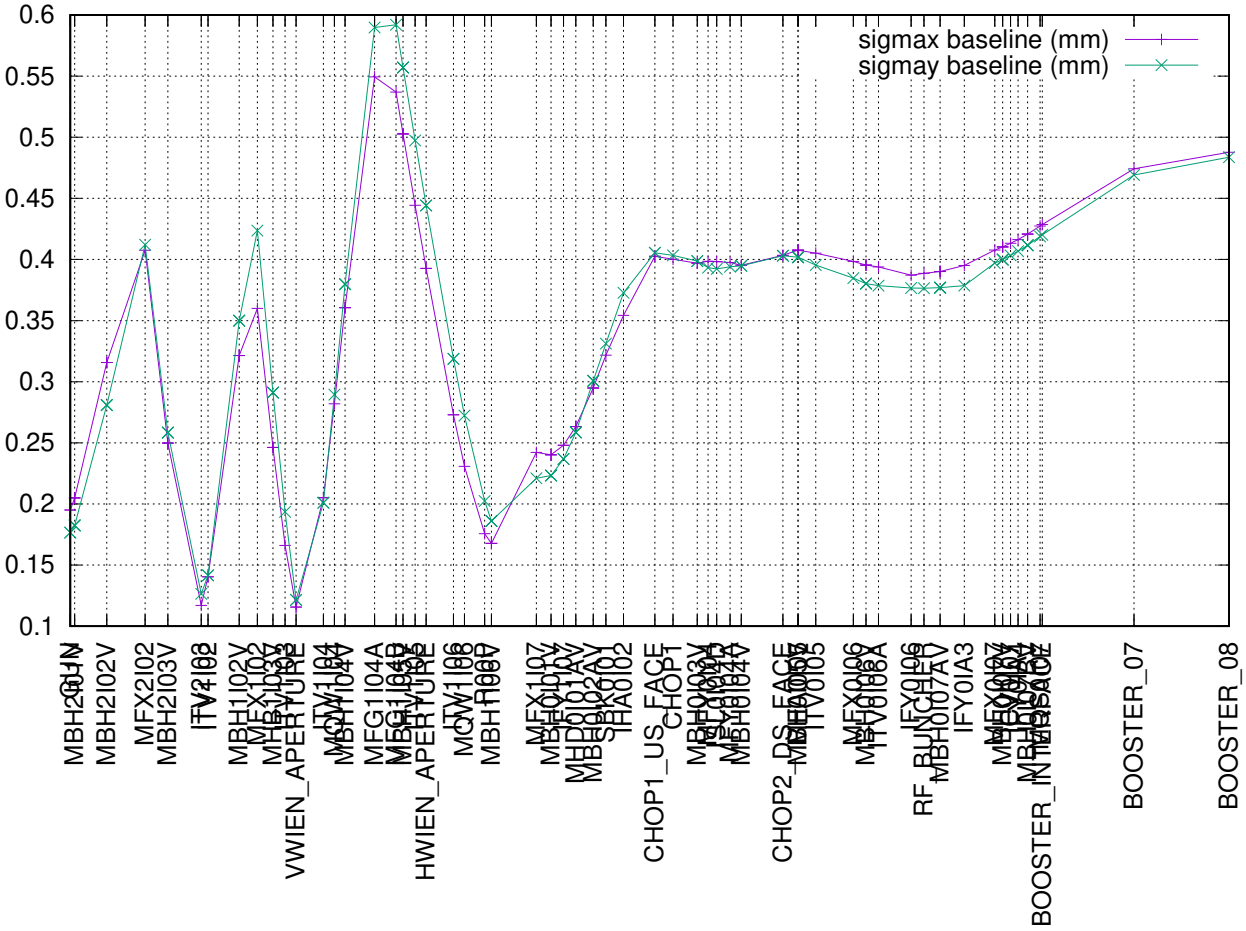
These optics are based on the 2020-04-07 layout and include the beamline from 0.19m downstream of the cathode to downstream of the Booster.

Knobs and constraints:

- Beam size should be less than 1.6mm and round
- 2I01 solenoid $\rightarrow$ waist at entrance of 15° dipole
- 1I02 solenoid $\rightarrow$ waist at entrance of VWIEN
- Waist at HWIEN and Prebuncher
- 0I01 solenoid $\rightarrow$ waist at A1/A2
- 0I03 solenoid $\rightarrow$ waist at CHOPPER1 upstream
- 0I05 solenoid $\rightarrow$ waist at CHOPPER2 downstream
- 0I06/0I07 solenoids $\rightarrow$ match the rest of the way to the Booster.

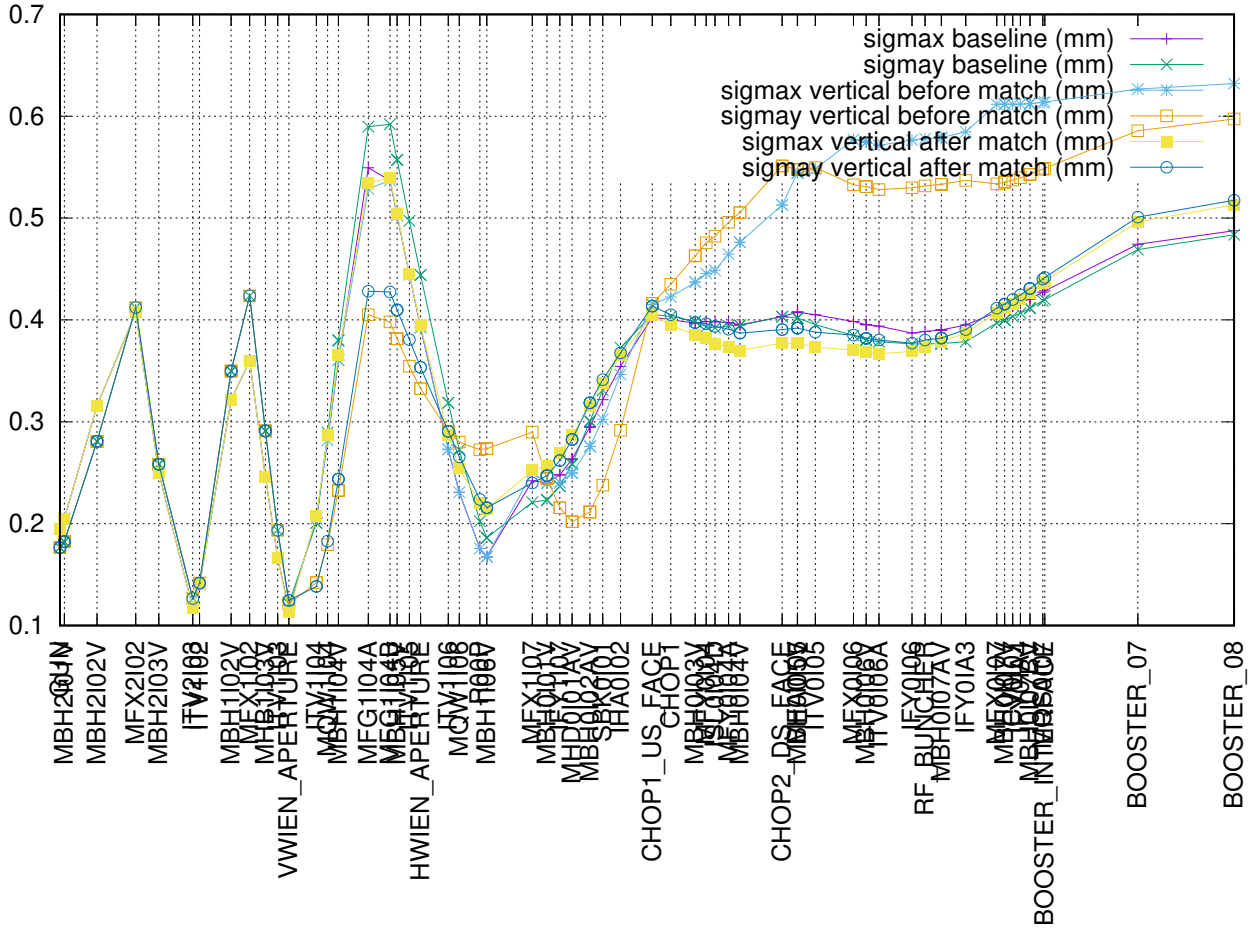
Baseline: Wien Filters OFF, Quads OFF



S1	S2	Q1	Q2	FGA	FGB	Q3	Q4	S3	S4	S5	S6	S7	S8
1996	2750	0	0	1232	-1246	0	0	1371	-18	21	-10	66	60

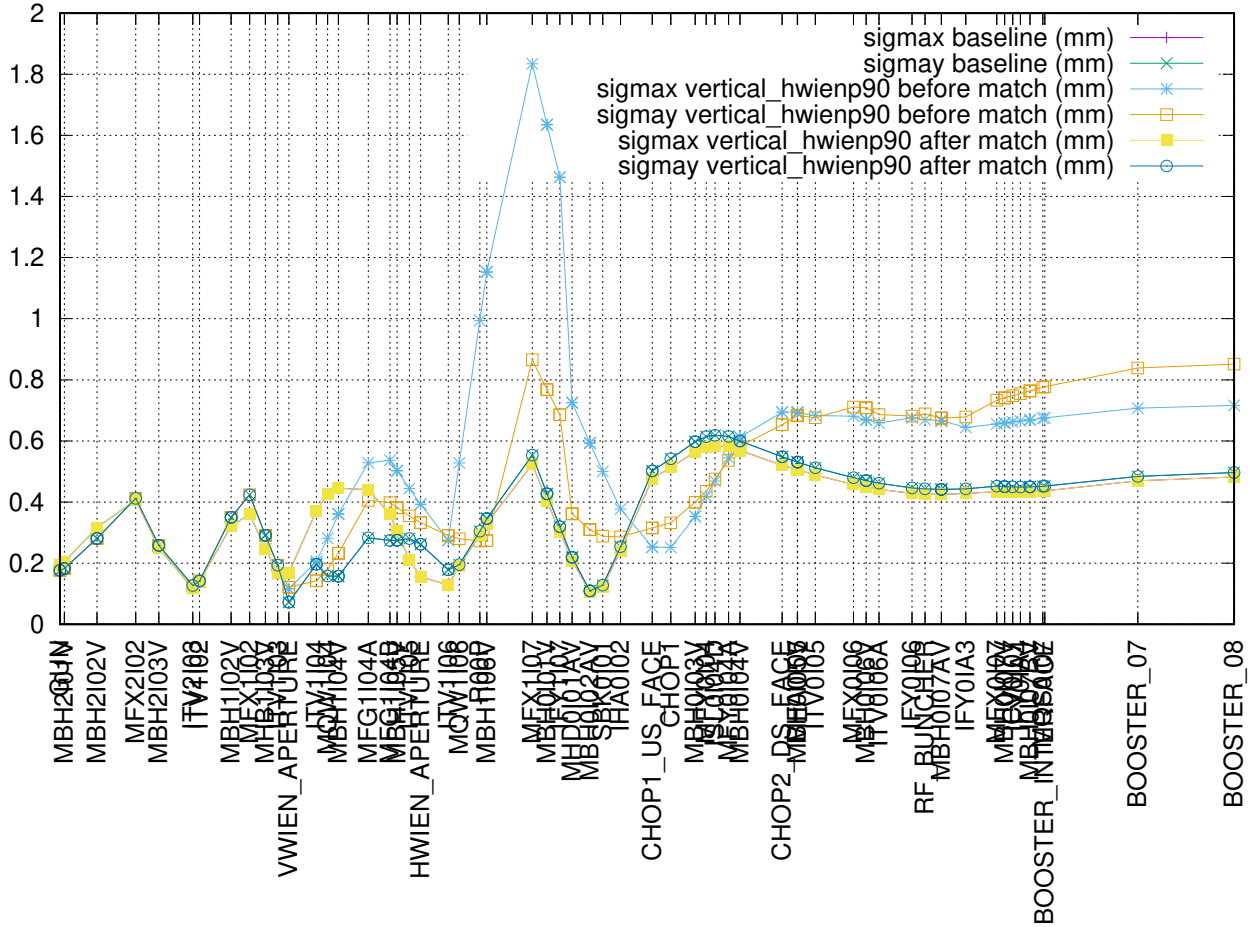
Units are field current in mA, with T=200keV

VWIEN +90



S1	S2	Q1	Q2	FGA	FGB	Q3	Q4	S3	S4	S5	S6	S7	S8
1996	2750	169	68	1232	-1246	699	-58	-172	-18	21	-9	98	60

VWIEN +90, HWIEN +90



S1	S2	Q1	Q2	FGA	FGB	Q3	Q4	S3	S4	S5	S6	S7	S8
1996	2750	-3096	690	1232	-1246	-841	1186	1926	24	322	-2	11	111

Conclusion

- Optically, the layout works.
- We need all four QWs to keep the optics under control for various Wien configurations.
- We don't need to spend money on Darsmstadt triplets or doublets.
- A spreadsheet with magnet settings for all configurations will be posted to the AIPINJ wiki.