Use the ion stripper in TT2 to increase the emittance and thereby limit the accumulated brightness:

Case 1: 192 bunches,
Accumulated Brightness~134 (192*0.70),
Brightness (N_b/ε_n)=0.70 [10^{11}/um],
Beta =20 m @ TT2 stripper,
Increase ε_n from 1.4 to 1.86 [um]

Case 2: 240 bunches,
Accumulated Brightness~134 (240*0.56),
Brightness (N_b/ε_n)=0.56 [10^{11}/um],
Beta =40 m @ TT2 stripper,
Increase ε_n from 1.4 to 2.32 [um]

Case 1: (192,0.70)

Adjusting the beta function at the stripper to 20m in both horizontal and vertical planes, gives an increase of the normalized emittance from 1.4 um to 1.86 um.

The optical functions before and after the stripper ($DISP1 = \frac{\Delta x}{\Delta p/p}$, $DISP2 = \frac{\Delta p_x}{\Delta p/p}$, $DISP3 = \frac{\Delta y}{\Delta p/p}$, $DISP4 = \frac{\Delta p_y}{\Delta p/p}$)

	DISP1	DISP2	ALFA11	BETA11	DISP3	DISP4	ALFA22	BETA22
Entry stripper	-2.4290	-0.0469	0.00000	20.00	-0.0321	0.0305	0.0000	20.00
Exit stripper	-2.4290	-0.0469	-0.00001	15.05	-0.0321	0.0305	0.0000	15.05

The following magnets are used for the matching of beta =20 m at the stripper (position 208) and for the matching the optical functions at the end of TT10 to the same values as the Q20 optics:

20m at stripper foil	QFO165	QDE180	QFO205	QDE207	QDE210	QFO215	QDE220S	QFO225S	QFO375	QIID1001	QIIF1002	QIID1003	QIF1004	QID1005	QIF1006	QID1007M	QIF1008M	QID1011M	QIF1012M
K1 [Gradient/Bρ]	0.0744	-0.0586	0.1269	-0.1082	0	0.0901	-0.098	0.0995	0.1377	-0.1559	0.138	-0.099	0.106	-0.1052	0.11	-0.0962	0.106	-0.0796	0.089
Current [A]	150	-119	257	-219	0	182	-194	197	274	-312	274	-196	175	-174	182	-159	175	-132	147
Max Current [A]	300	350	500	450	400	500	350	350	330	400	300	200	200	200	200	200	200	200	200

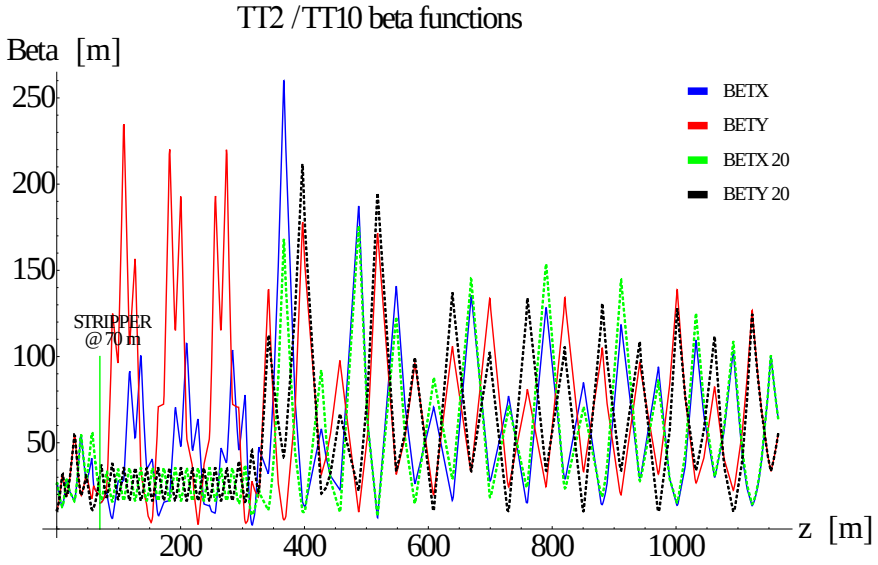
NB! The same magnets are also used for case 2 (40m at the stripper), because they give a precise matching and can also avoid the maximum current limits of the magnets and power supplies. The exact calibration curves for the magnets (strength vs current) is still under investigation, however they will have no effect because the currents are much below the allowed maximum currents (except for the magnets QFO375 and QIID1003, but for these magnets the calibration curves are well known and the currents are largely inside the linear range). In addition, since both TT2 and TT10 are pulsed lines, there are no problems with maximum rms currents.

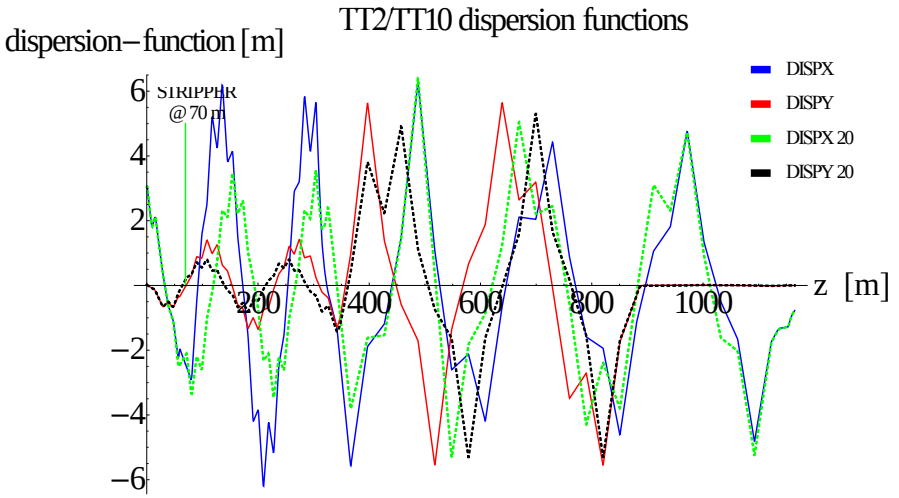
There are other combinations of strengths that also give perfect matching to the Q20 optics, where the QFO375 and QIID1003 are far from the limits, but where the apertures are increased.

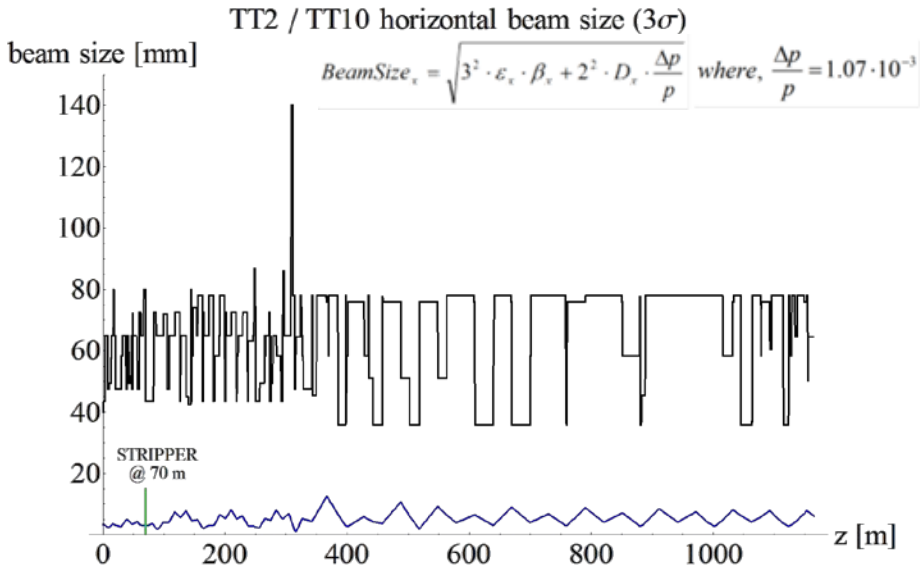
For comparison, here is the similar table for the Q20 optics

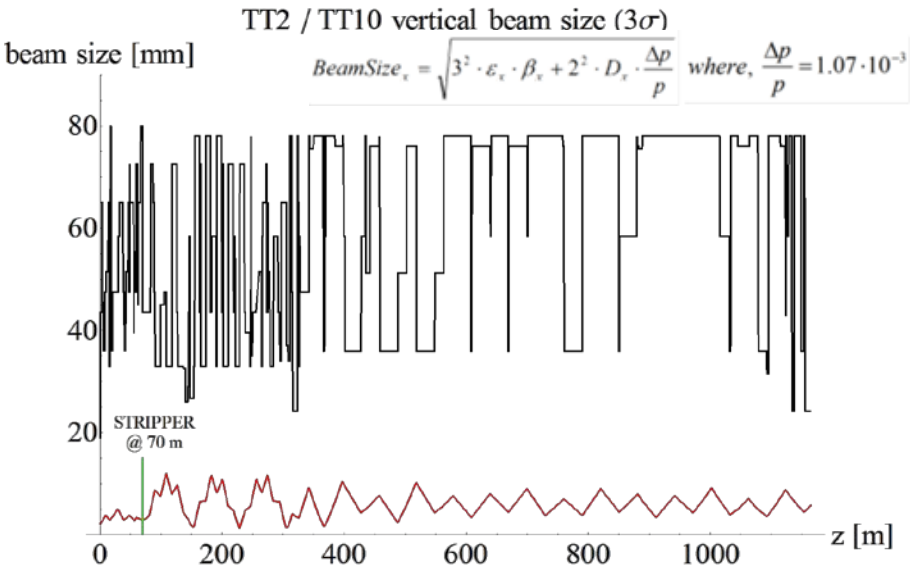
Q20 Optics	QFO165	QDE180	QFO205	QDE207	QDE210	QFO215	QDE220S	QFO225S	QFO375	QIID1001	QIIF1002	QIID1003	QIF1004	QID1005	QIF1006	QID1007M	QIF1008M	QID1011M	QIF1012M
K1 [Gradient/Bρ]	0.0727	-0.0724	0.061	0	-0.1042	0.0713	-0.1044	0.1069	0.1322	-0.0976	0.138	-0.0691	0.1193	-0.0866	0.1266	-0.0876	0.1143	-0.0923	0.0877

Case 1: (192,0.70)









Notice that the optical functions in the majority part of the TT10 line are very similar to the Q20 optics i.e. the matching to 20m is essentially kept in TT2

Case 2: (240,0.56)

Adjusting the beta function at the stripper to 40m in both horizontal and vertical planes, gives an increase of the normalized emittance from 1.4 um to 2.32 um.

The optical functions before and after the stripper ($DISP1 = \frac{\Delta x}{\Delta p/p}$, $DISP2 = \frac{\Delta p_x}{\Delta p/p}$, $DISP3 = \frac{\Delta y}{\Delta p/p}$, $DISP4 = \frac{\Delta p_y}{\Delta p/p}$)

	DISP1	DISP2	ALFA11	BETA11	DISP3	DISP4	ALFA22	BETA22
Entry stripper	-2.5040	-0.0686	0	40.00	-0.2301	0.0205	0	40.00
Exit stripper	-2.5040	-0.0686	-0.00001	24.14	-0.2301	0.0205	-0.00001	24.14

The following magnets are used for the matching of beta =40 m at the stripper (position 208) and for the matching the optical functions at the end of TT10 to the same values as the Q20 optics:

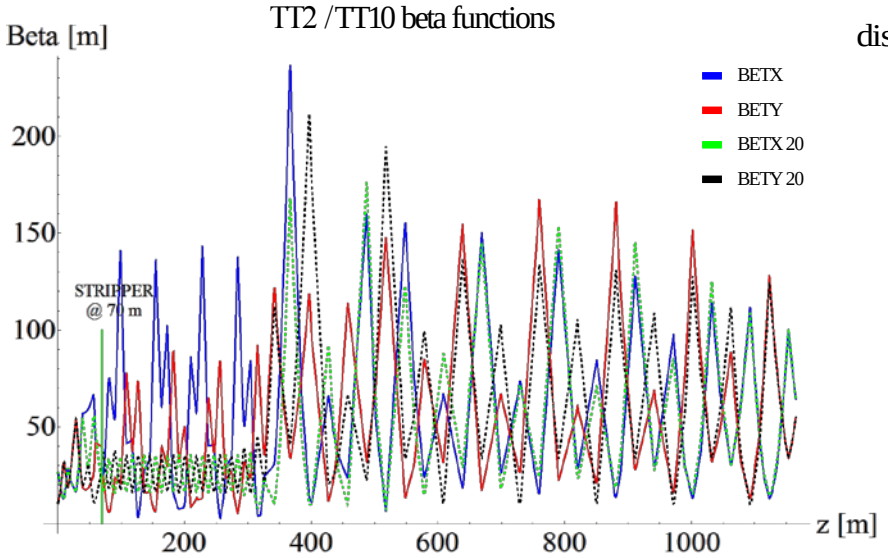
40m at stripper foil	QFO165	QDE180	QFO205	QDE207	QDE210	QFO215	QDE220S	QFO225S	QFO375	QIID1001	QIIF1002	QIID1003	QIF1004	QID1005	QIF1006	QID1007M	QIF1008M	QID1011M	QIF1012M
K1 [Gradient/Bρ]	0.0418	-0.0027	0.1021	-0.1078	-0.0988	0.0608	-0.1159	0.1204	0.1255	-0.1069	0.138	-0.0652	0.106	-0.0896	0.11	-0.0907	0.106	-0.0882	0.0899
Current [A]	85	-6	206	-218	-197	123	-230	239	249	-212	274	-130	175	-148	182	-150	175	-146	149
Max Current [A]	300	350	500	450	400	500	350	350	350	400	300	200	200	200	200	200	200	200	200

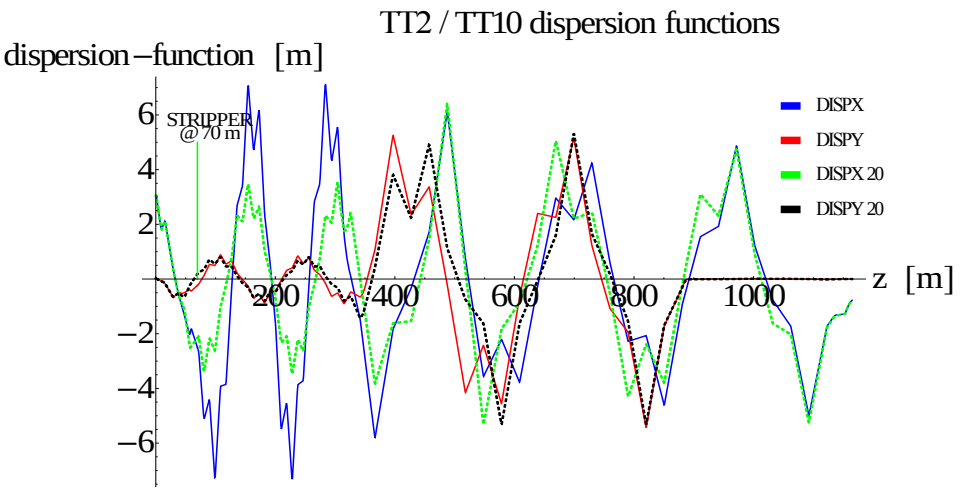
For comparison, here is the similar table for the Q20 optics

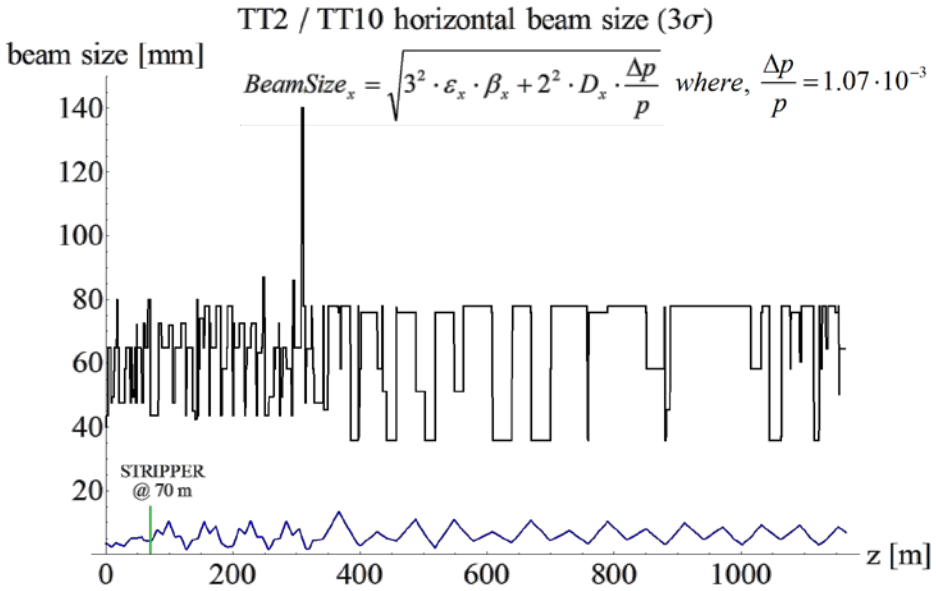
Q20 Optics	QFO165	QDE180	QFO205	QDE207	QDE210	QFO215	QDE220S	QFO225S	QFO375	QIID1001	QIIF1002	QIID1003	QIF1004	QID1005	QIF1006	QID1007M	QIF1008M	QID1011M	QIF1012M
K1 [Gradient/Bρ]	0.0727	-0.0724	0.061	0	-0.1042	0.0713	-0.1044	0.1069	0.1322	-0.0976	0.138	-0.0691	0.1193	-0.0866	0.1266	-0.0876	0.1143	-0.0923	0.0877

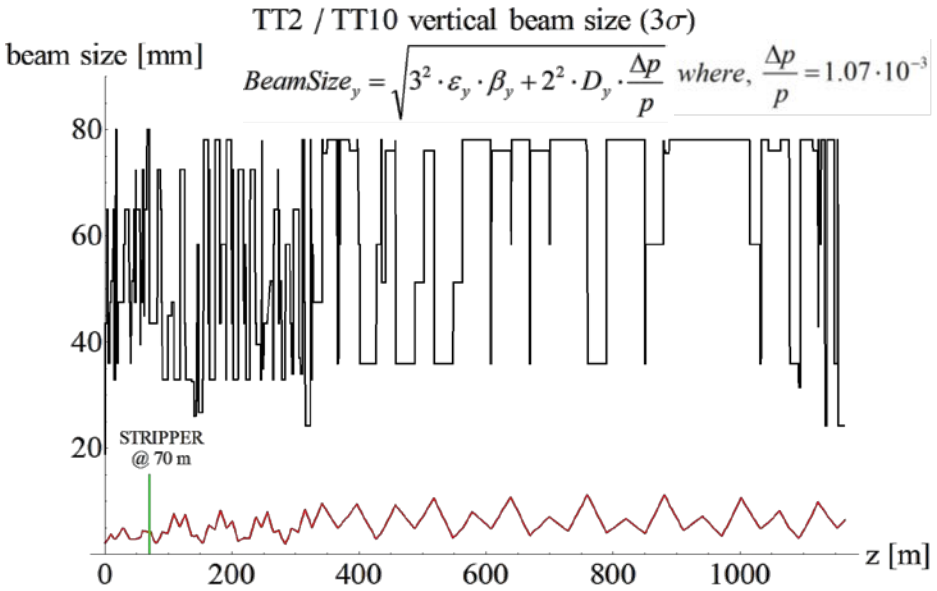
NB! The power supplies for the magnets in TT2 are in the building 250 and 269, while the power supplies for TT10 are all in BA1. That the power supplies are in different buildings will make the interlock harder to make. However, it is unfortunately not possible to only use the magnets in TT2 – doing so, would leave the resulting currents at the limit and the optics functions at the end of TT10 would not be matched correctly.

Case 2: (240,0.56)









Notice that the optical functions in the majority part of the TT10 line are very similar to the Q20 optics i.e. the matching to 20m is essentially kept in TT2