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Beam Emittance using MW in MI8 for two different LINAC beam Currents

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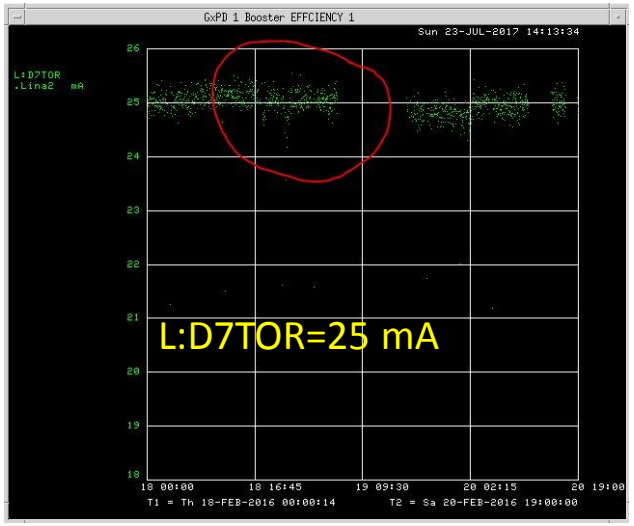
Goals: Beam emittance in the Booster as a function of the LINAC beam current.

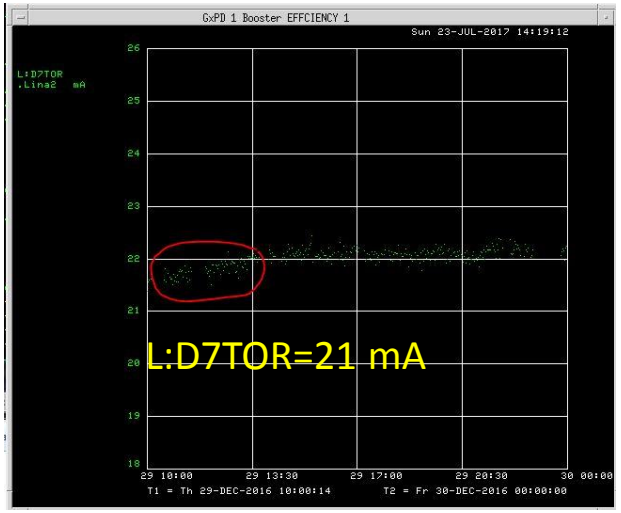
Abstract: On Feb 18th, 2016 Ming-Jen et. al., have measured a) beam transverse emittance in the MI 8 Beam line as function number of Booster turn (up to a maximum booster turn of 16) and b) contribution to the beam emittance due to the stripping foil (Beams-Doc-5247-V1). Subsequently a similar measurement was carried out on Dec. 29, 2016 with up to 20 Booster turns, but with about 11% more beam than previous measurements. During these two measurements the LINAC beam current were about 25 mA and 21 mA, respectively. Using these measurement data we find the following: 1) the beam emittance growth pattern in the 2nd measurement was significantly different from that of the 1st measurement., 2) at ~4.8E12 ppBc the transverse emittance of the beam from the Booster at extraction was nearly 3π-mm-mr less than that measured at higher LINAC beam current.

Raw Data

Data of 20160226			emit: pi-mm-mr		
BT	B:CHG0	95% H		95%V	
6	1.8	9.85	0.13	10.34	1.55
8	2.4	10.40	0.13	10.76	1.38
10	3.1	11.21	0.13	11.61	1.29
12	3.7	12.41	0.13	12.81	1.12
14	4.2	14.37	0.16	14.94	1.65
16	4.8	16.52	0.17	17.41	2.17

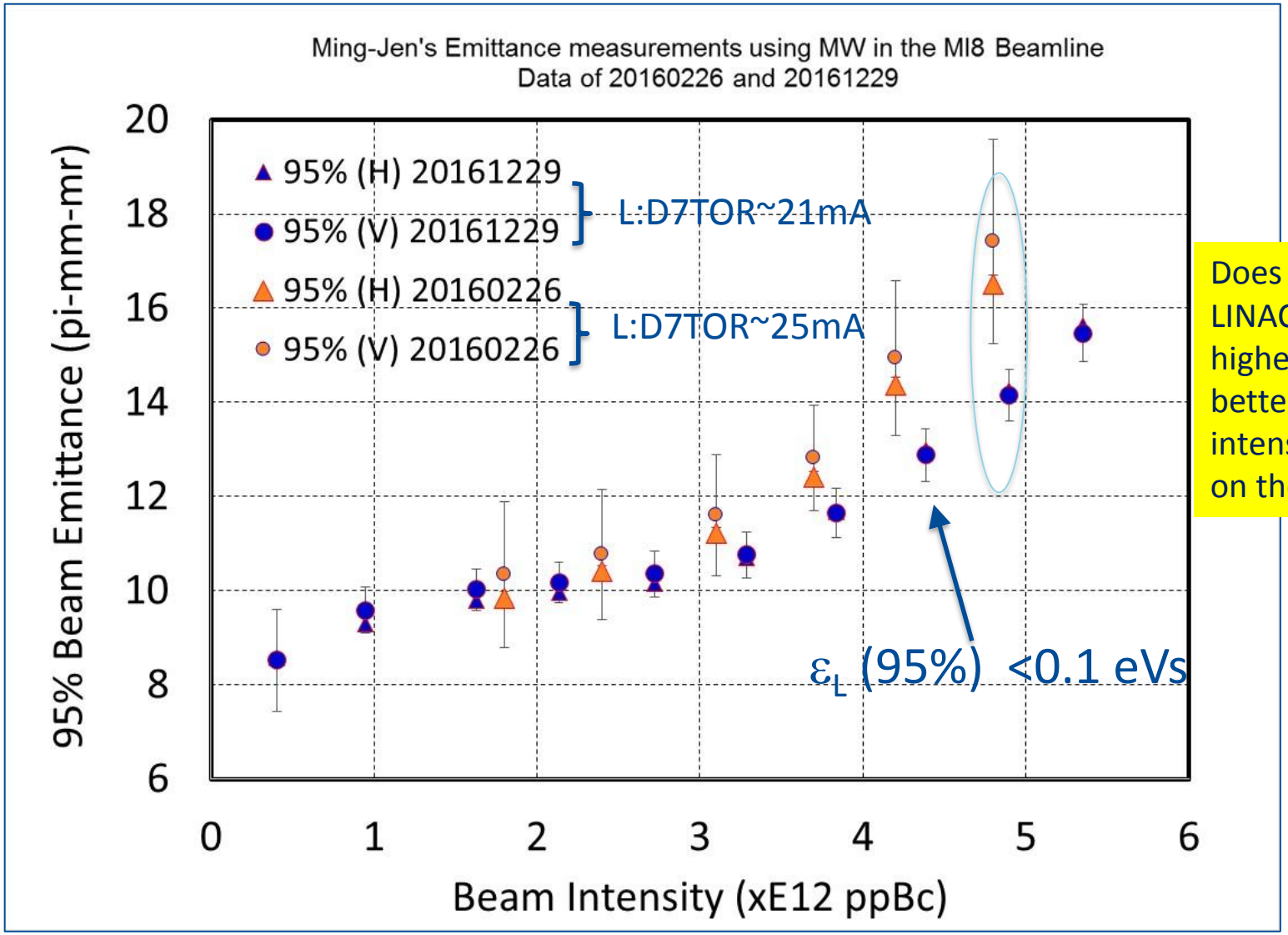
Data of 20161229			emit: pi-mm-mr		
BT	R:TOR853	95% H		95%V	
2	0.40	8.57	0.44	8.52	1.08
4	0.95	9.29	0.13	9.59	0.50
6	1.63	9.79	0.11	10.02	0.44
8	2.14	9.96	0.11	10.17	0.43
10	2.72	10.16	0.09	10.35	0.49
12	3.29	10.69	0.06	10.76	0.49
14	3.84	11.67	0.08	11.65	0.52
16	4.38	12.98	0.12	12.88	0.55
18	4.90	14.24	0.15	14.16	0.55
20	5.35	15.64	0.19	15.47	0.60





Transverse Emittance in the MI8 Beamline

(MW Data of 20160222 and 20161229, by Ming-Jen)



Does this imply, lower LINAC current and higher number of BT is better for higher intensity beam power on the neutrino target?