Proton Beam Spot Size

MERIT EVO Meeting

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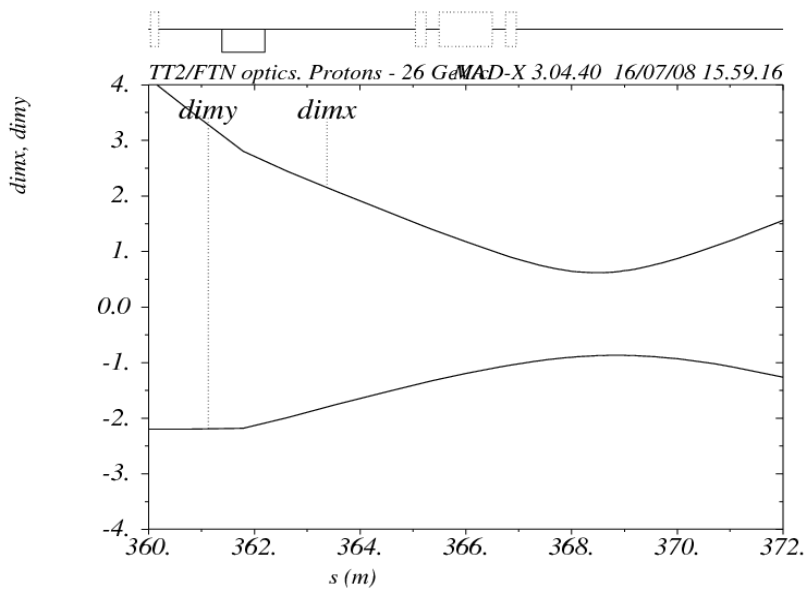
Harold G. Kirk
Brookhaven National Laboratory

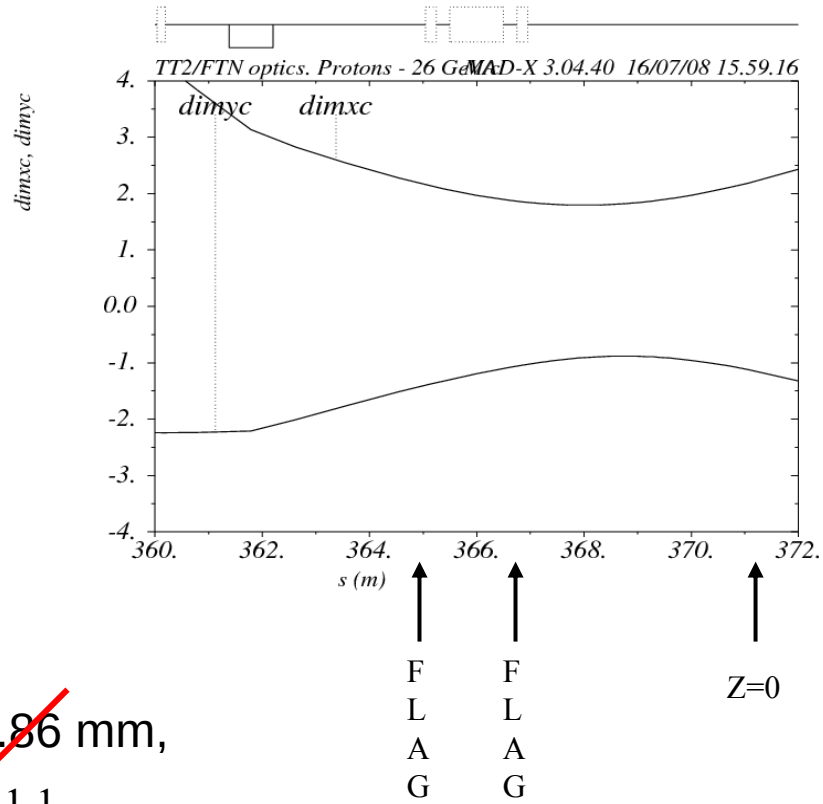
Beam envelope (1-sigma) - ε=0.25 (mm.mrad), Dp=0.1%

Ilias Efthymiopoulos July 16, 2008

Without dispersion term



With dispersion term



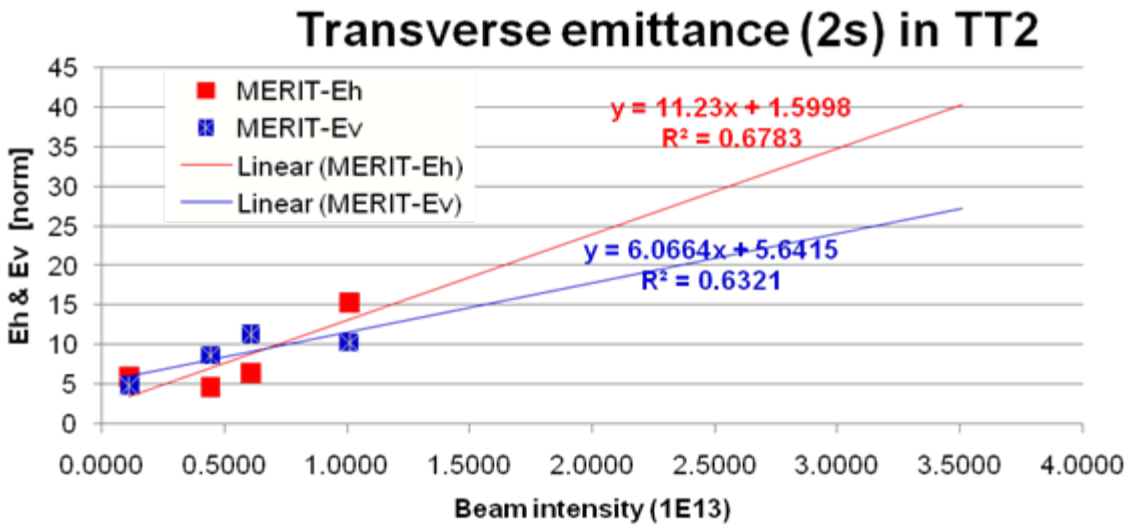
- σ(x) = 2.2mm , σ(y) = ~~0.86~~ 1.1 mm,

1σ Spot Sizes ε_g = 0.25mm-mrad dp/p=0.1

	No Dispersion		Dispersion	
Position	σ(x)	σ(y)	σ(x)	σ(y)
	mm	mm	mm	mm
Flag	0.95	1.05	1.95	1.05
Z=0	1.2	1.1	2.2	1.1

Emittance measurements

Use the data to extrapolate at higher intensities



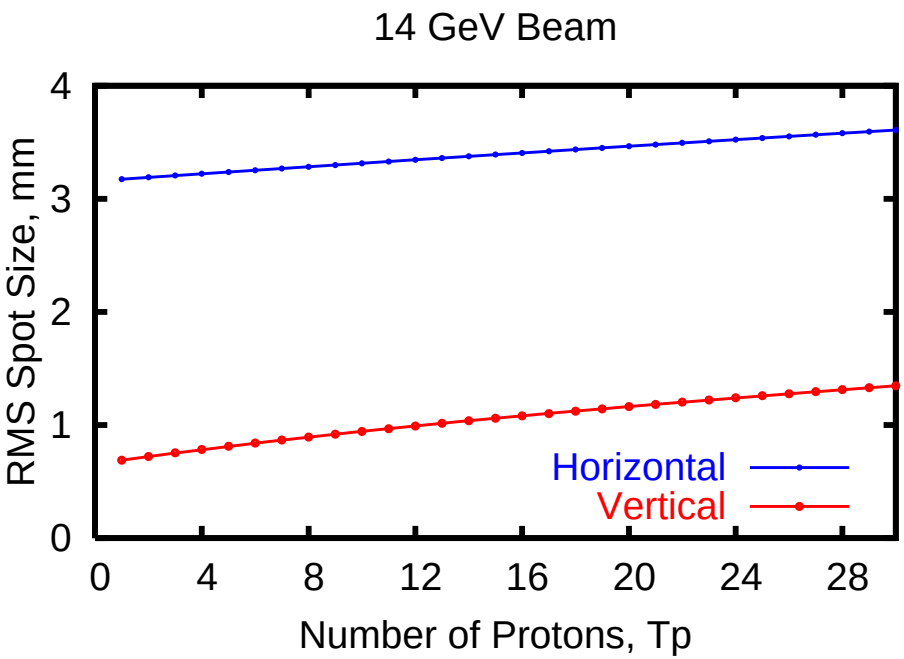
For 10Tp the 2σ Normalized emittances are:

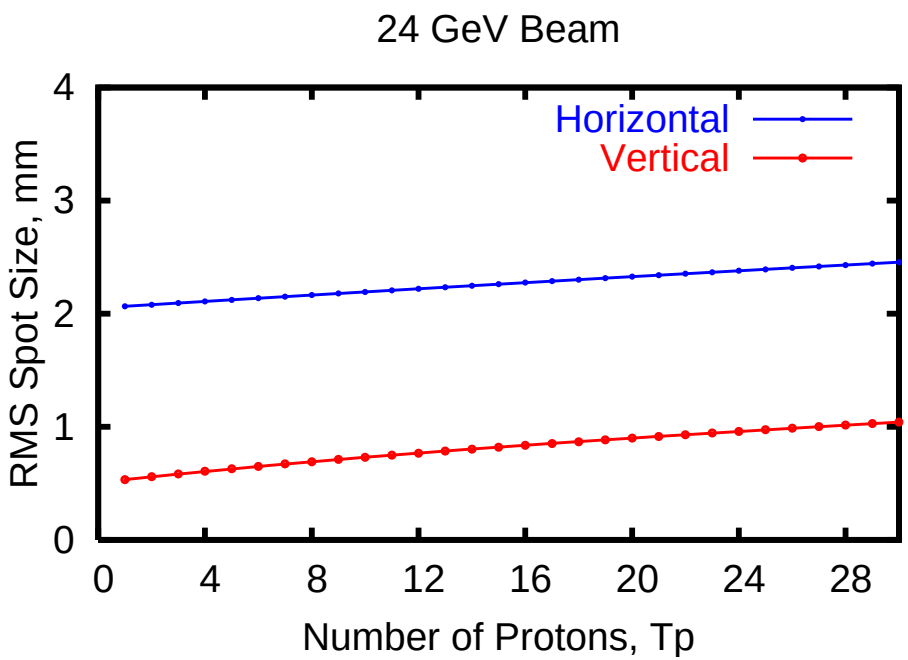
ε_h = 12.8 mm-mrad ε_v = 11.7 mm-mrad

For a 24 GeV proton beam $\beta\gamma = 26.57$

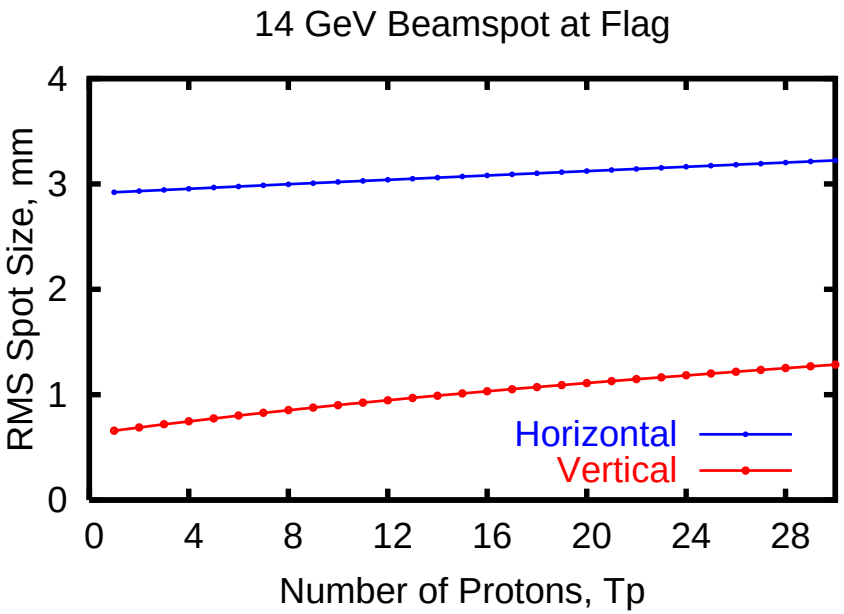
→ 1σ geometric emittances are: ε_h = 0.12 mm-mrad ε_v = 0.11 mm-mrad

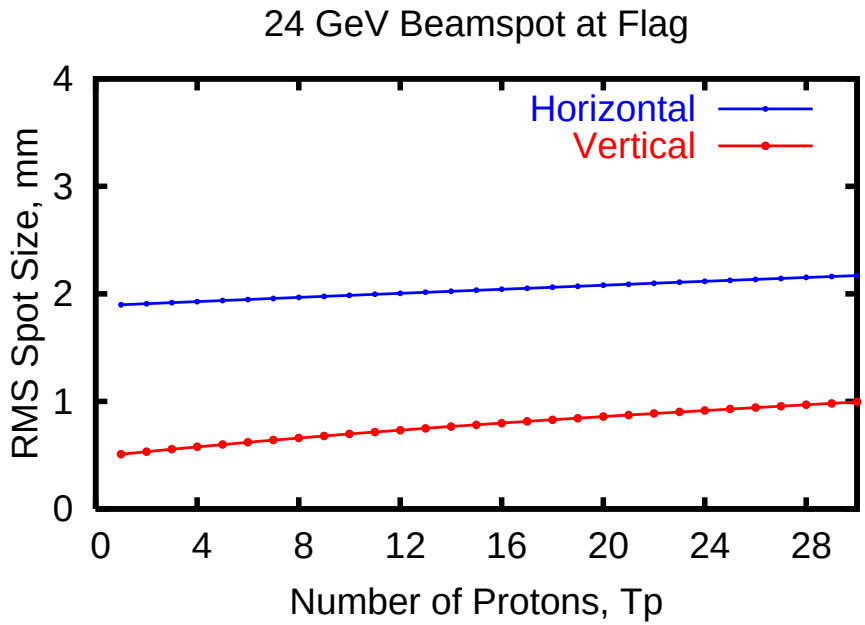
1σ Spot Size at Z=0



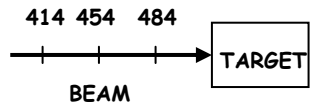


1σ Spot Size at Flag

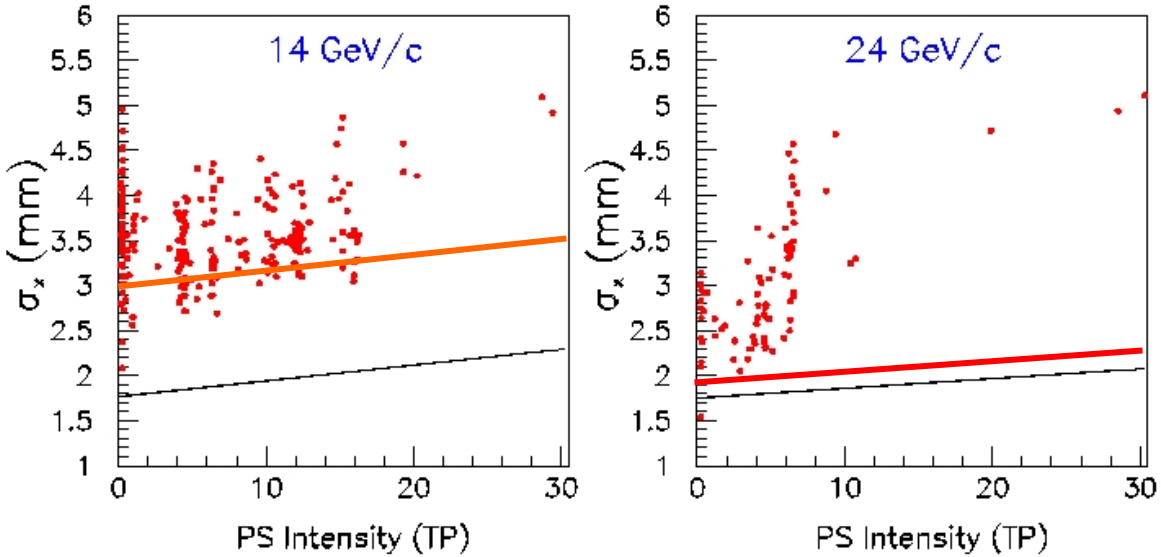


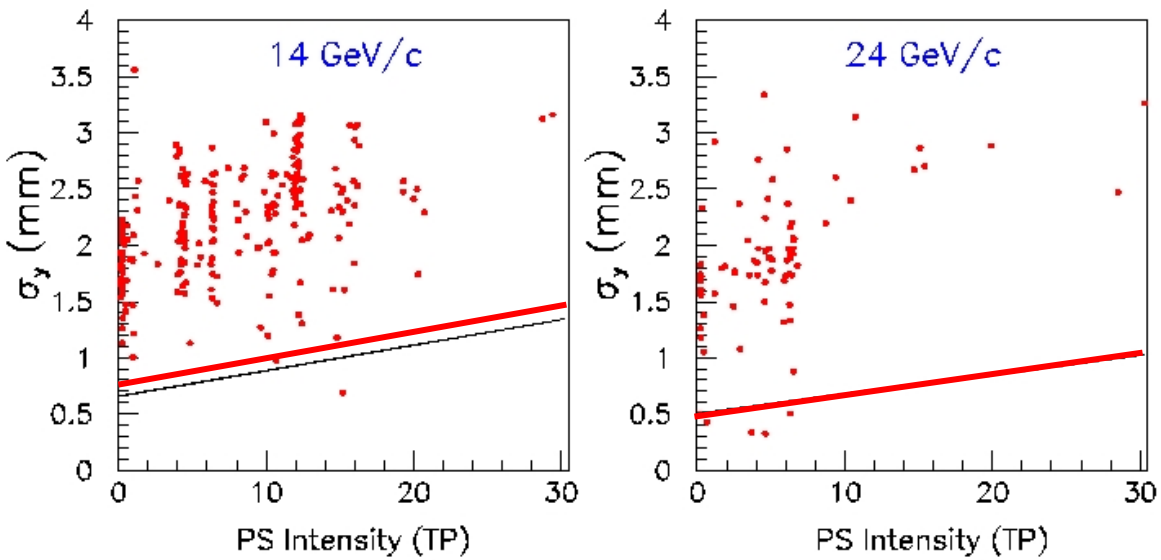


Results: Beam size vs beam intensity (after correction)



Camera 484





G. Skoro Aug. 13, 2008

Dots: from beam monitors data

Lines: from beam optics calculations

——— : from this calculation