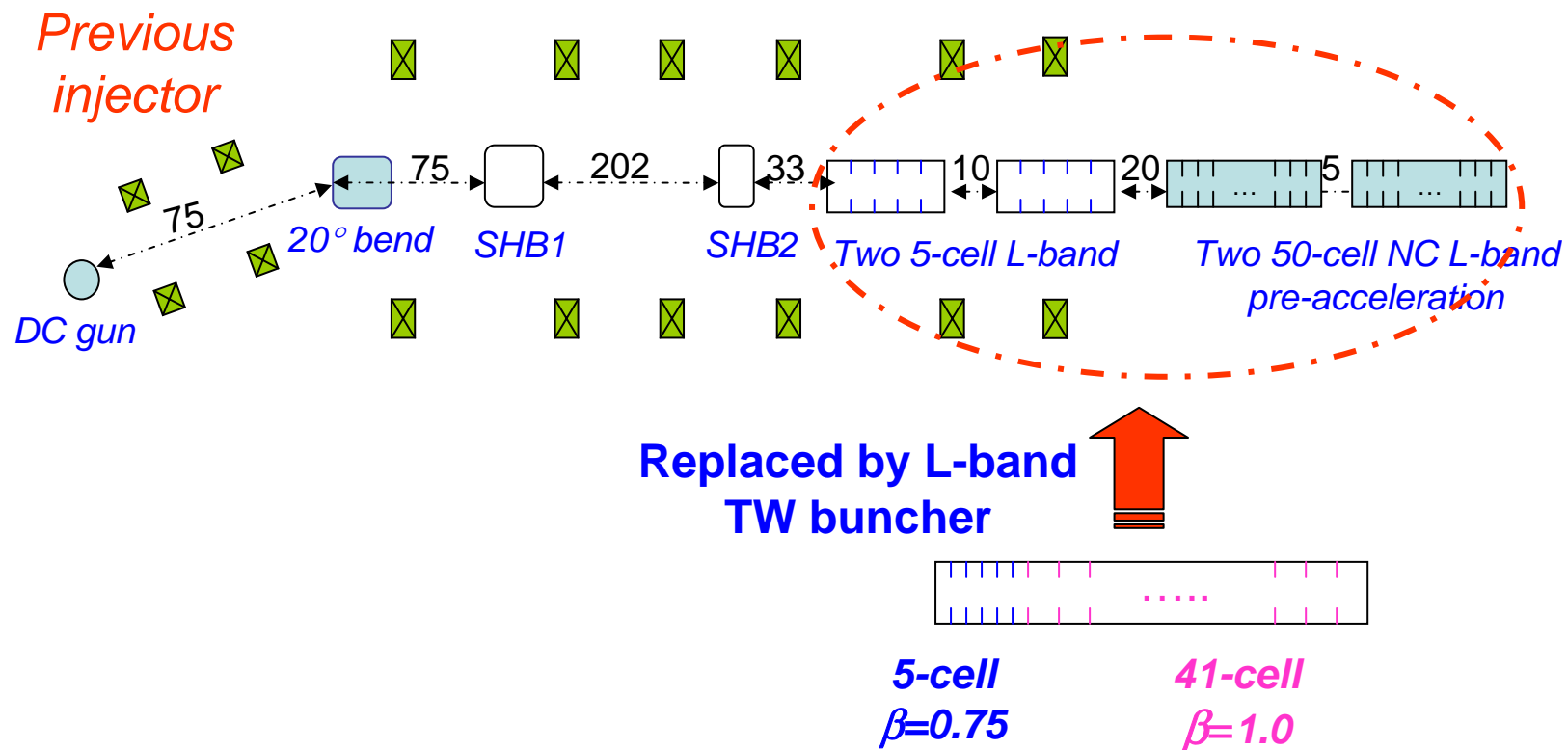
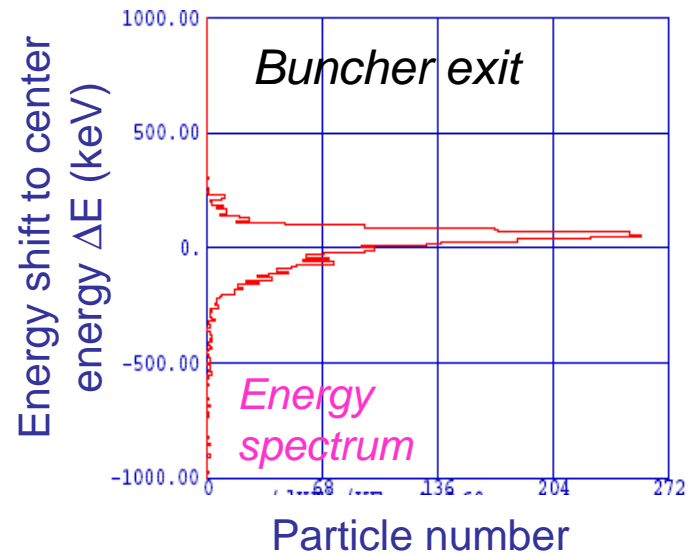
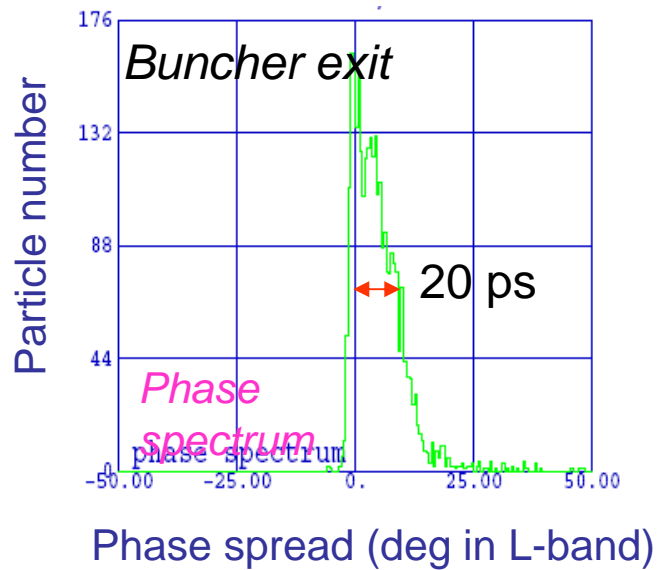
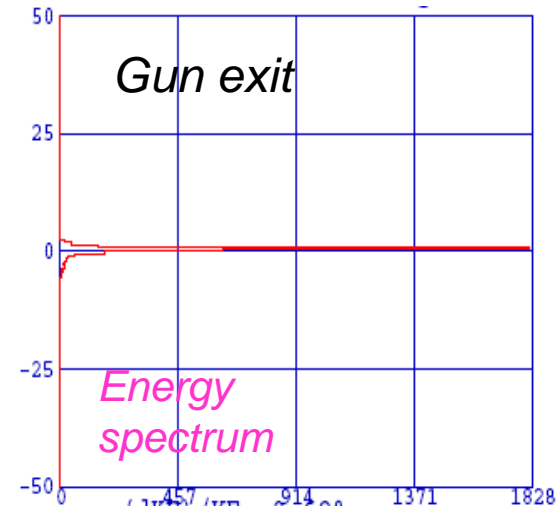


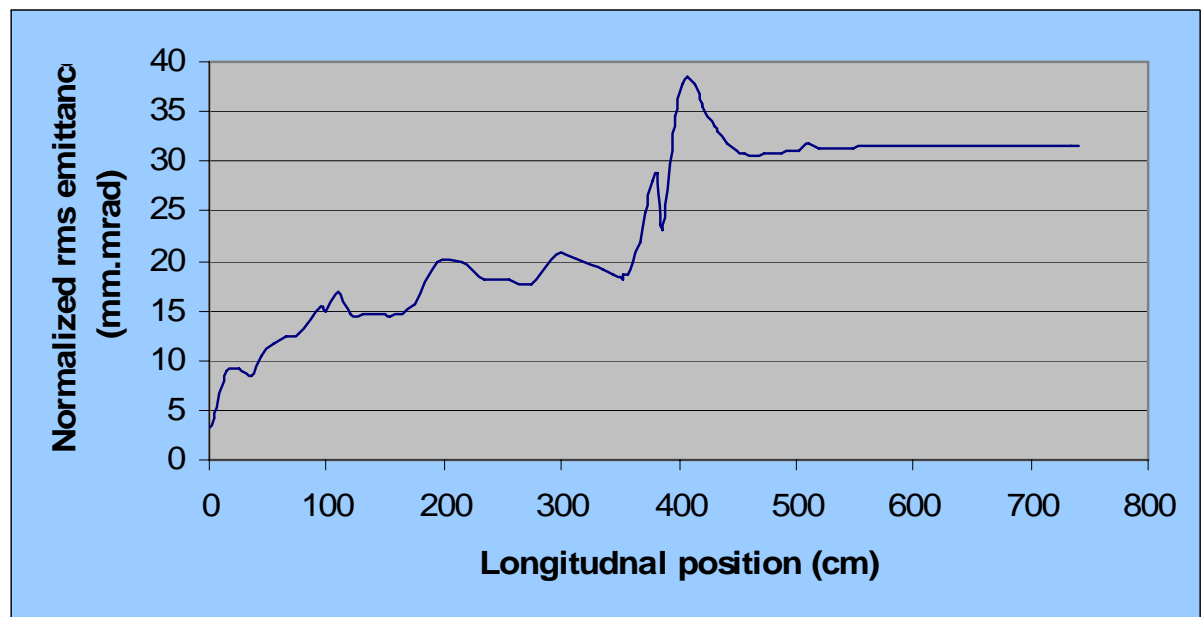
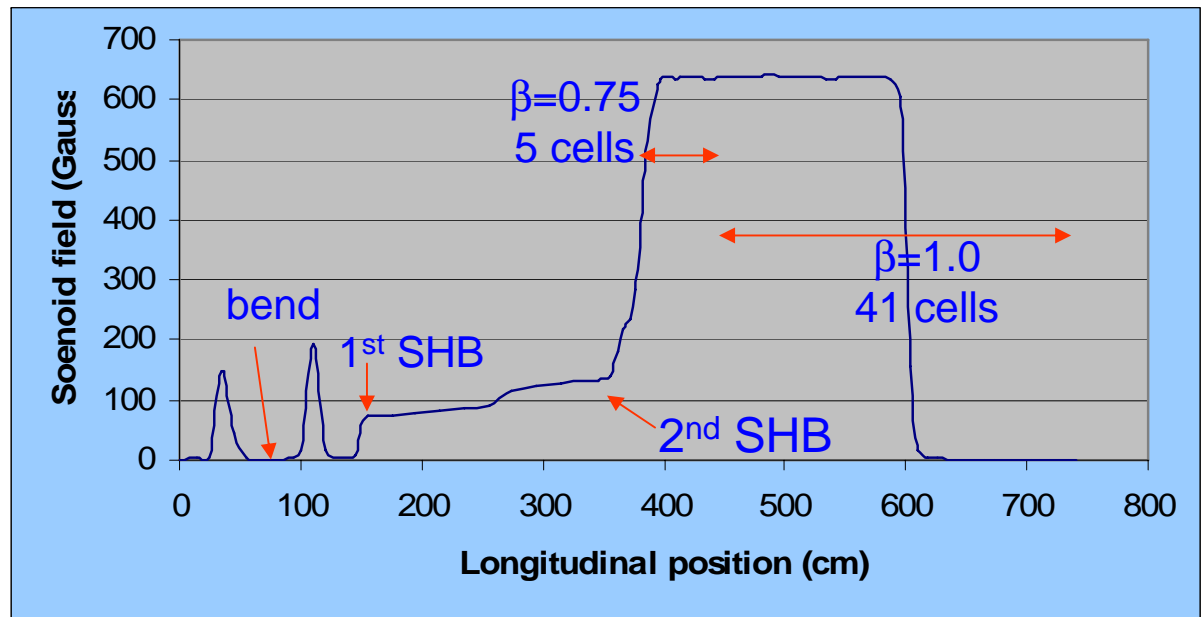
Buncher developments

- Previous buncher: two $\beta=1$ five-cell SW buncher
- A new TW taper- β buncher is initiated:

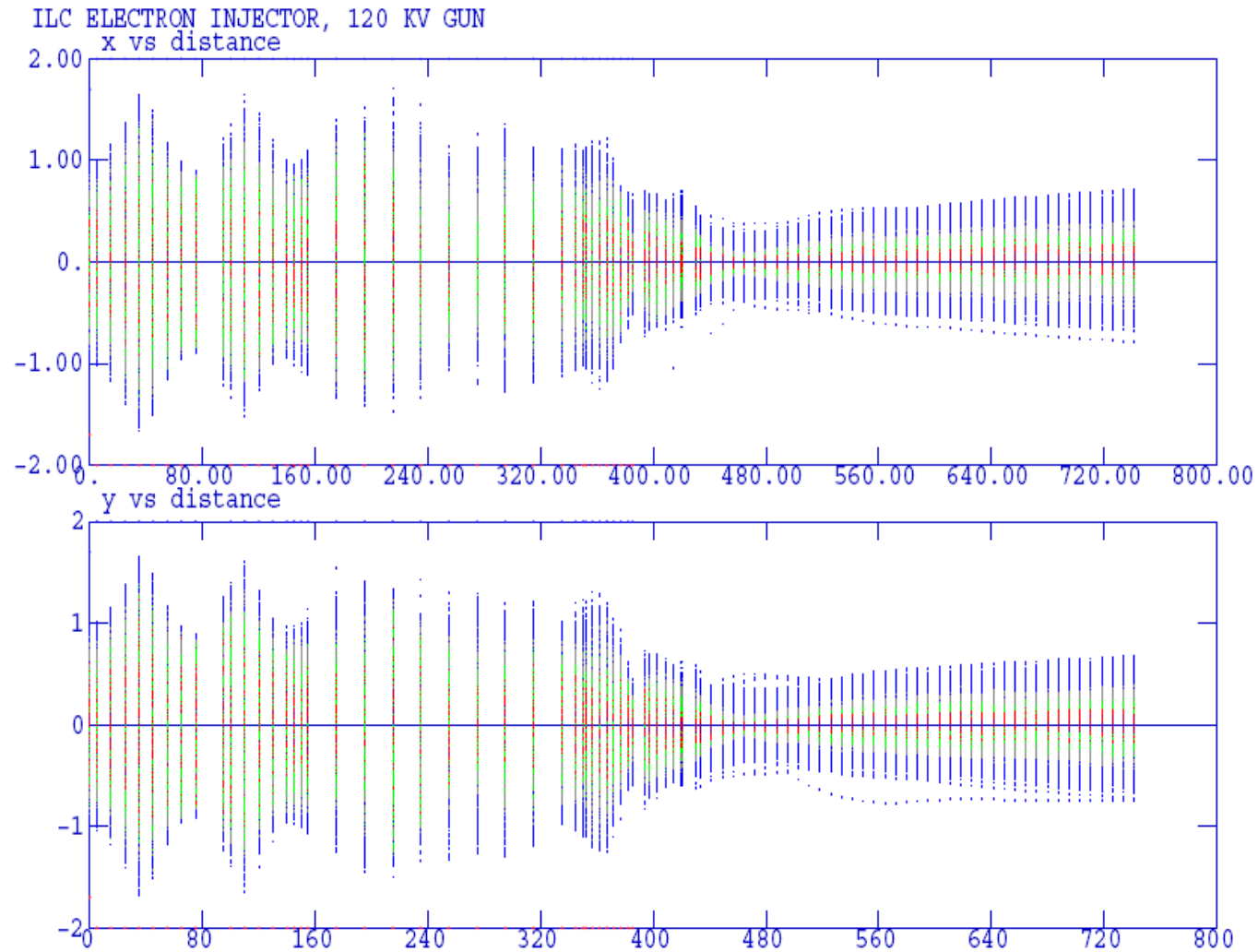


Phase-space using TW buncher





Beam envelope using TW buncher

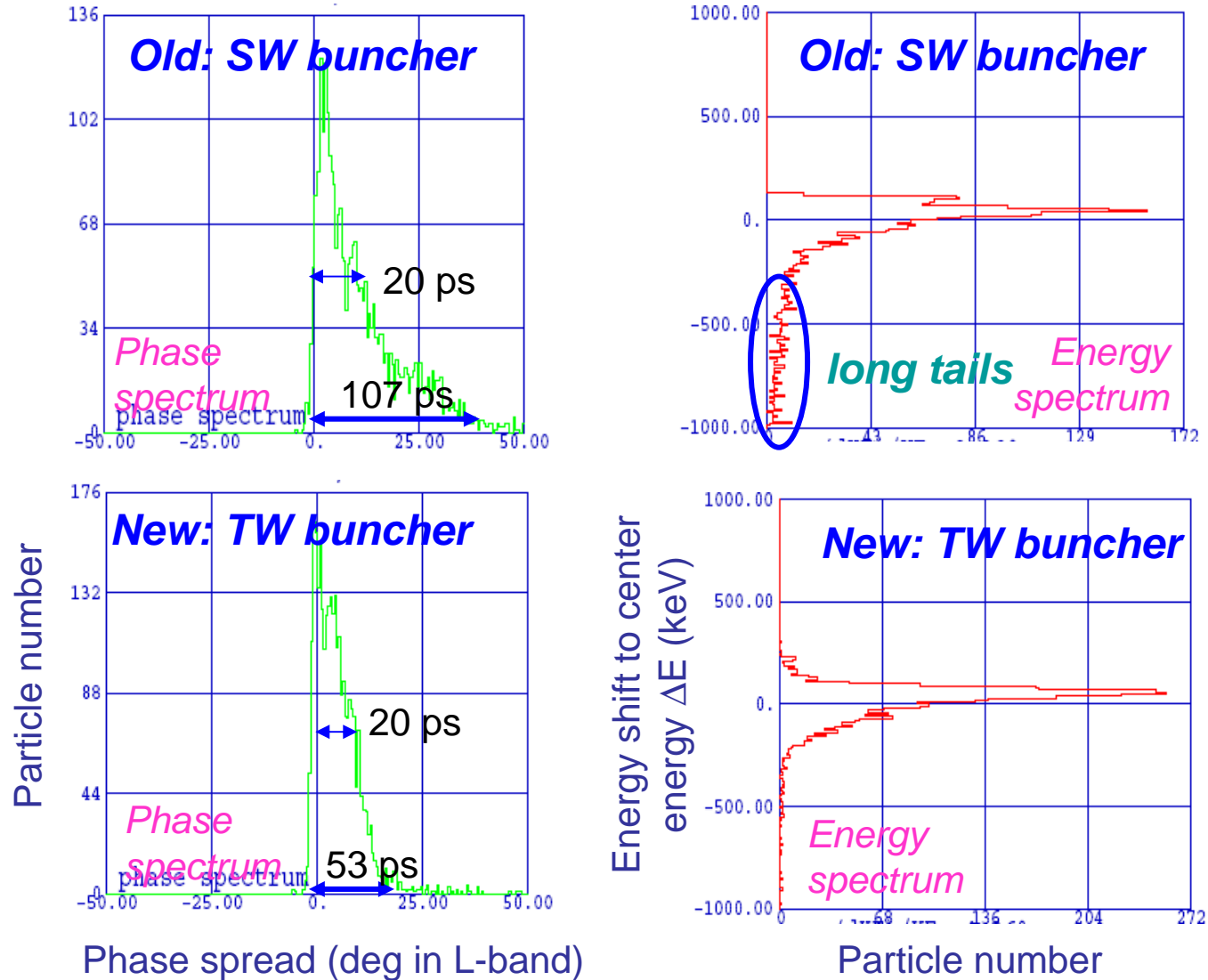


Summary for TW buncher

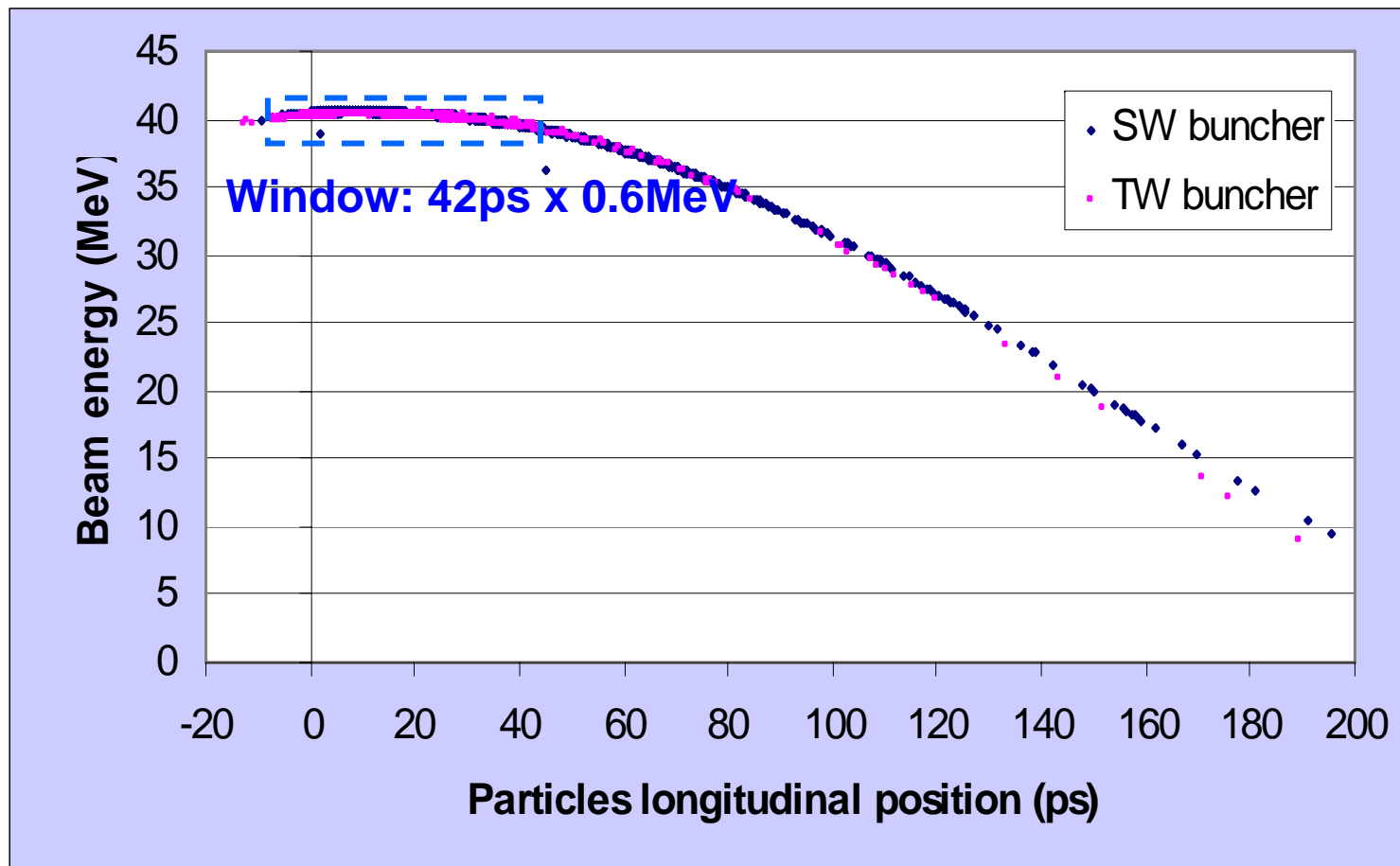
- We initiated a TW L-band buncher: $\beta=0.75$ 5-cell cavities and $\beta=1.0$ 41-cell cavities (note number of cells is arbitrary).
- Energy is 40 MeV; energy spread: 83 keV (FWHM) and 0.6 MeV (full width).
- Bunch length: 20 ps (FWHM) and 53 ps (full width)
- Input bunch charge at the gun is 6.4 nC, output charge with window (0.6 MeV x 42 ps) at 40 MeV is 6.1 nC.
- Normalized rms emittance 32 μm .
- Need RF structure expert to define more accurate structures for the buncher.

Comparisons between $\beta=1$ SW buncher
and taper- β TW buncher

Phase and energy spectrum



Energy - phase



Comparisons (cont')

- Parameters comparison at 40 MeV

	<i>SW buncher</i>	<i>TW buncher</i>
<i>Bunch length</i>	20 ps (FWHM)	20 ps (FWHM)
	106 ps (FW)	53 ps (FW)
<i>Energy spread</i>	83 keV (FWHM)	83 keV (FWHM)
	>1.5 MeV (FW)	0.6 MeV (FW)
<i>Norm. Emit.</i>	42 μm (rms)	32 μm (rms)
<i>Charge @gun</i>	6.4 nC	6.4 nC
<i>Charge @40MeV within window</i>	4.4 nC	6.1 nC
<i>(window: 42 ps x 0.6 MeV)</i>		

- All parameters in TW buncher are better than in SW, especially TW buncher has an extremely high bunching efficiency.