MI proton coalescing efficiency and proton multibatch operation
Some observations

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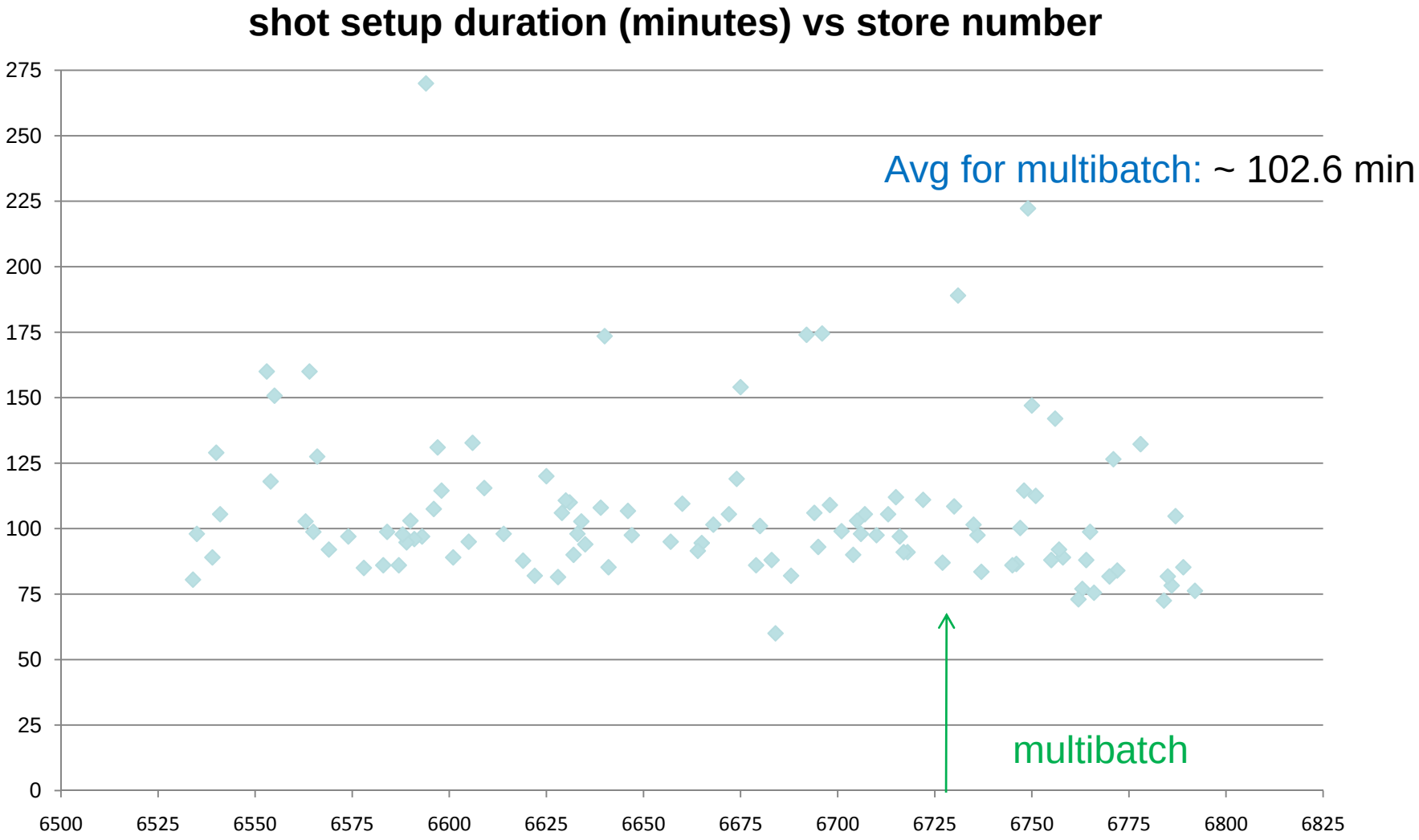
February 13, 2009

Duration of shot setup

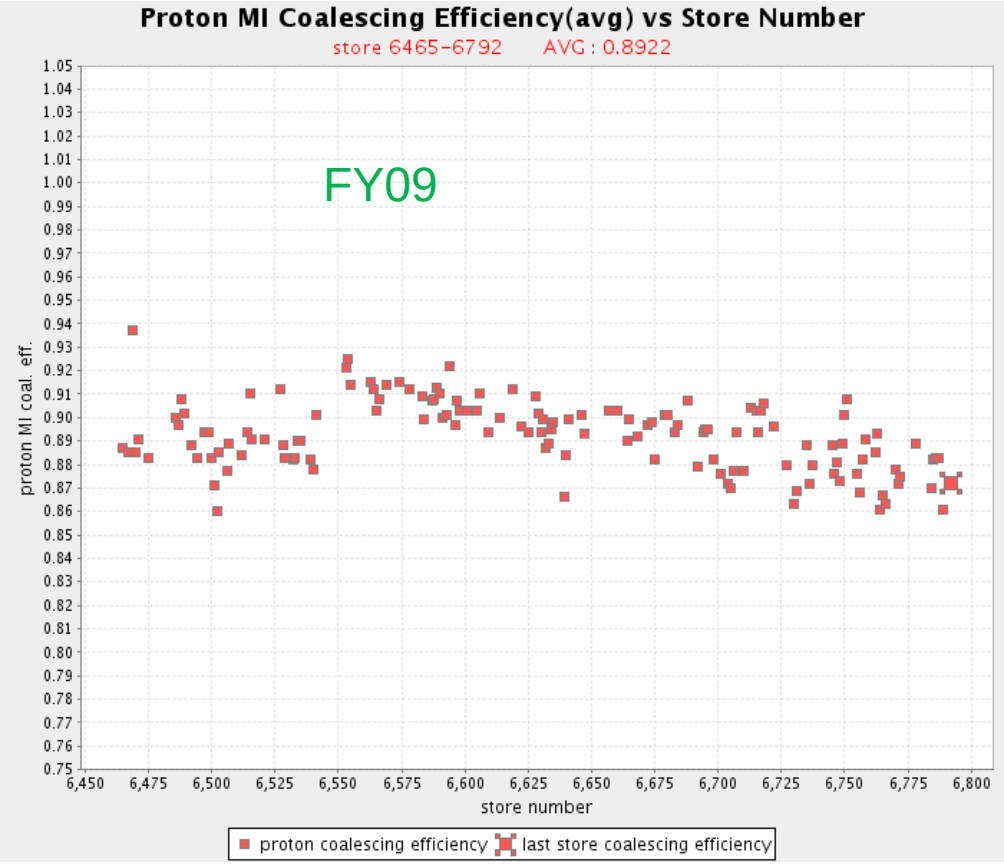
Nov. 1, 2008 – Feb. 10, 2009

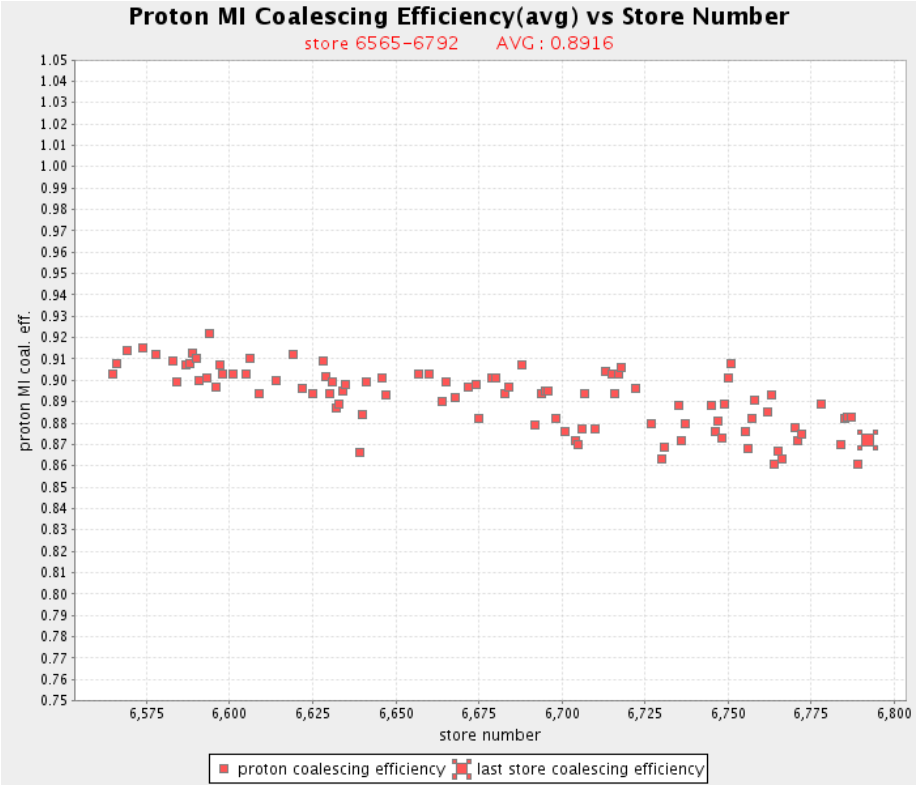


MI proton coalescing efficiency

Nov. 1, 2008 – Feb. 10, 2009

stores 6534-6792

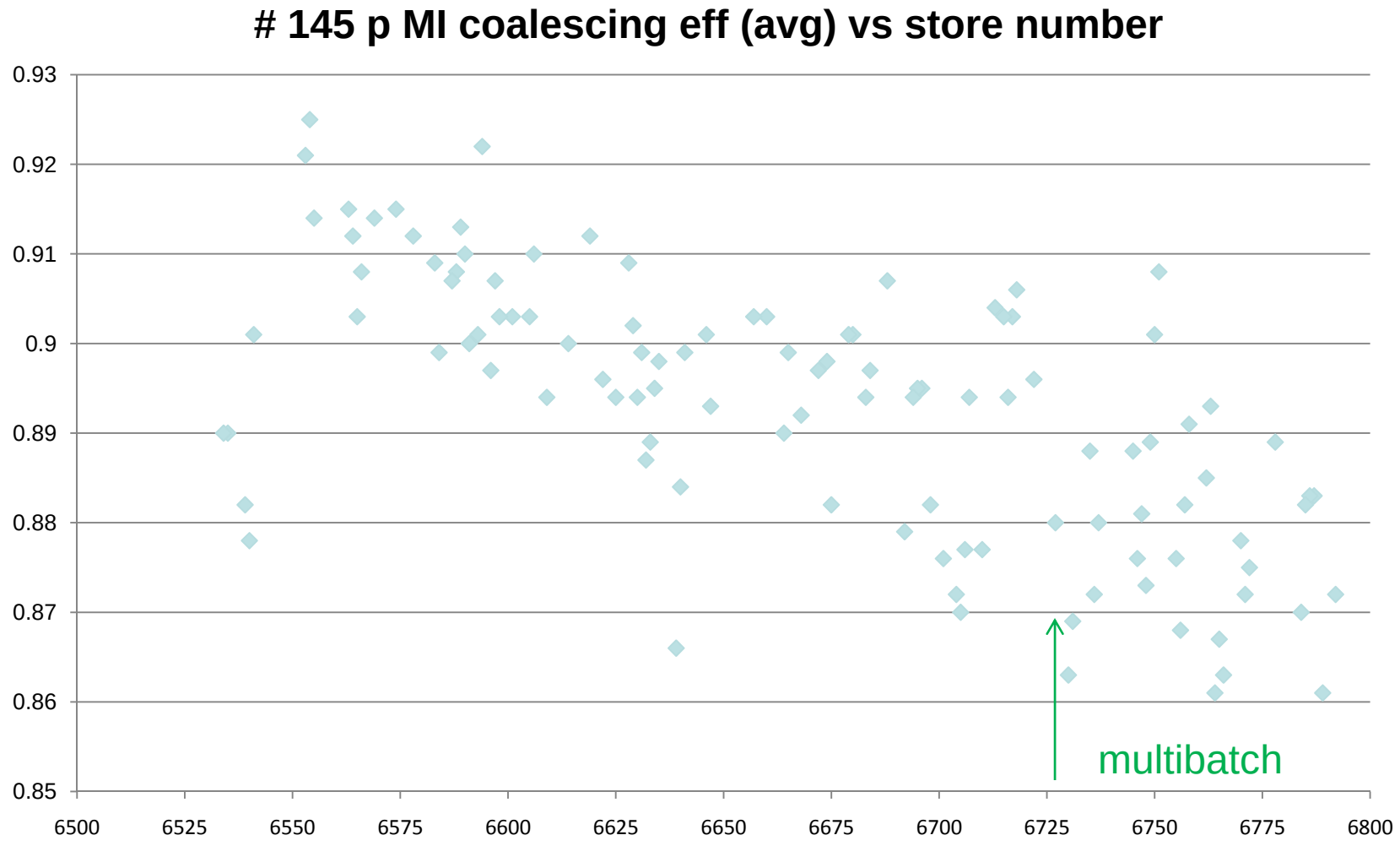




MI proton coalescing eff. vs store number

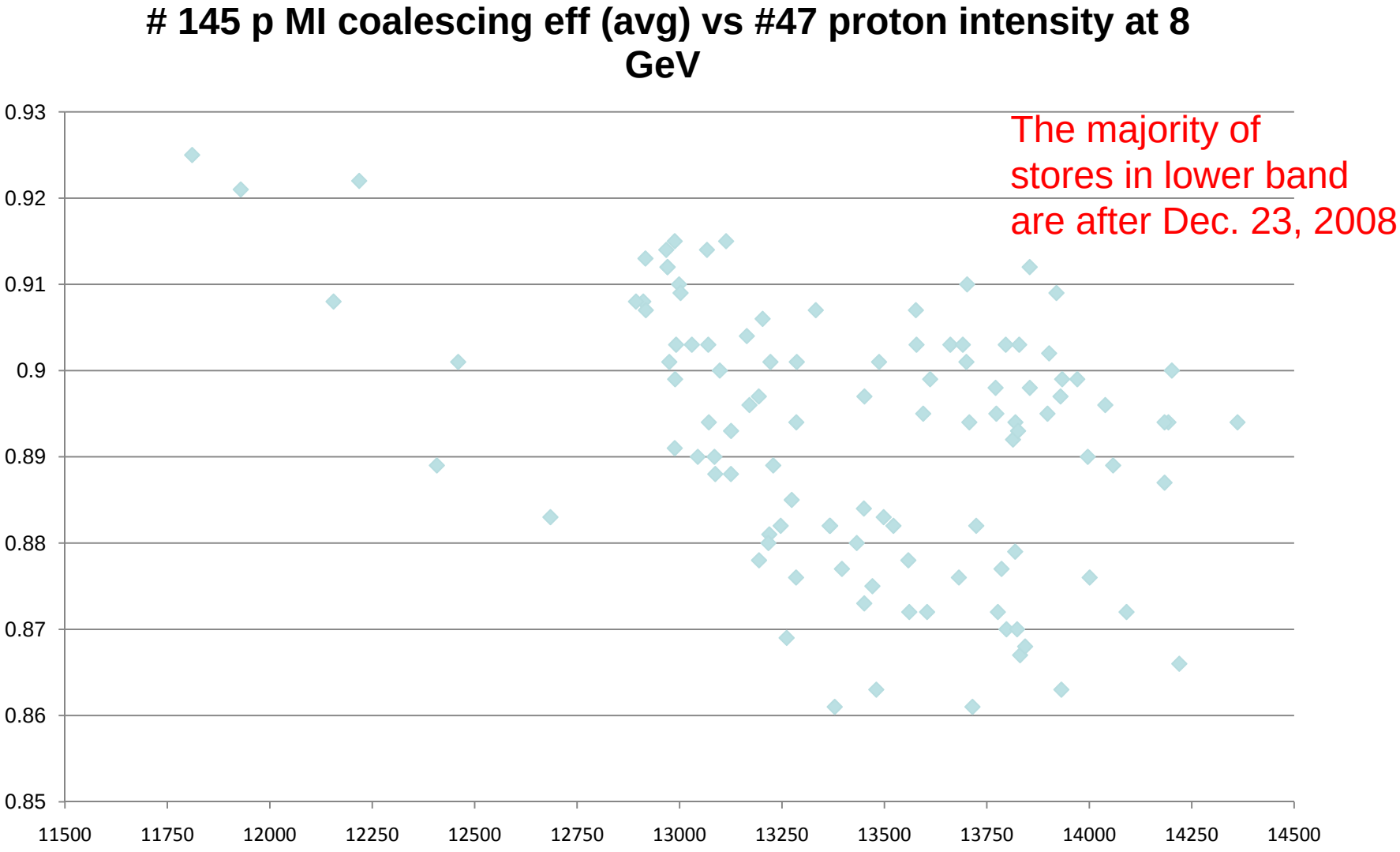
Nov. 1, 2008 – Feb. 10, 2009

Zoomed in version



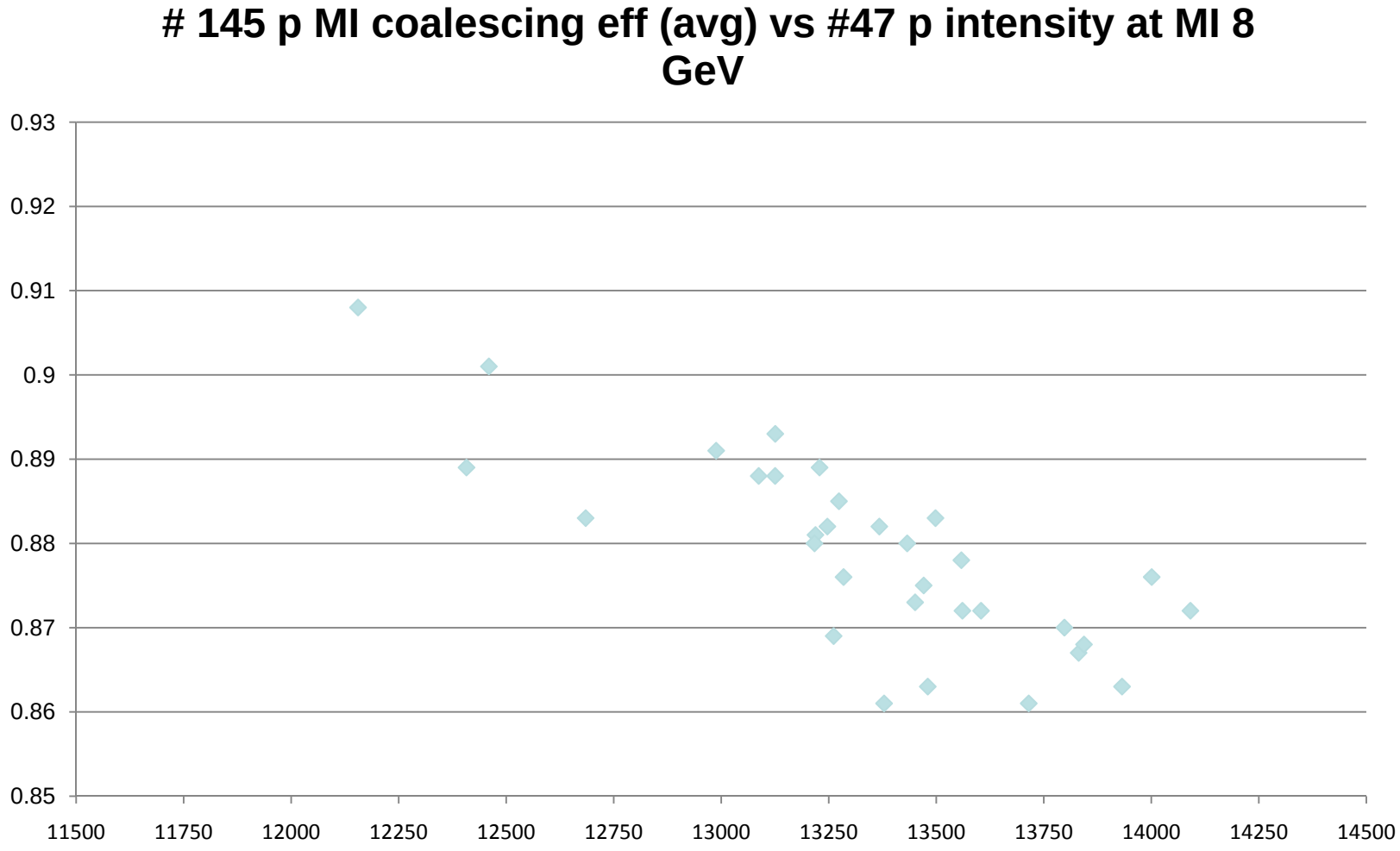
MI proton coalescing eff. vs proton intensity (e9) at 8 GeV

Nov. 1, 2008 – Feb. 10, 2009

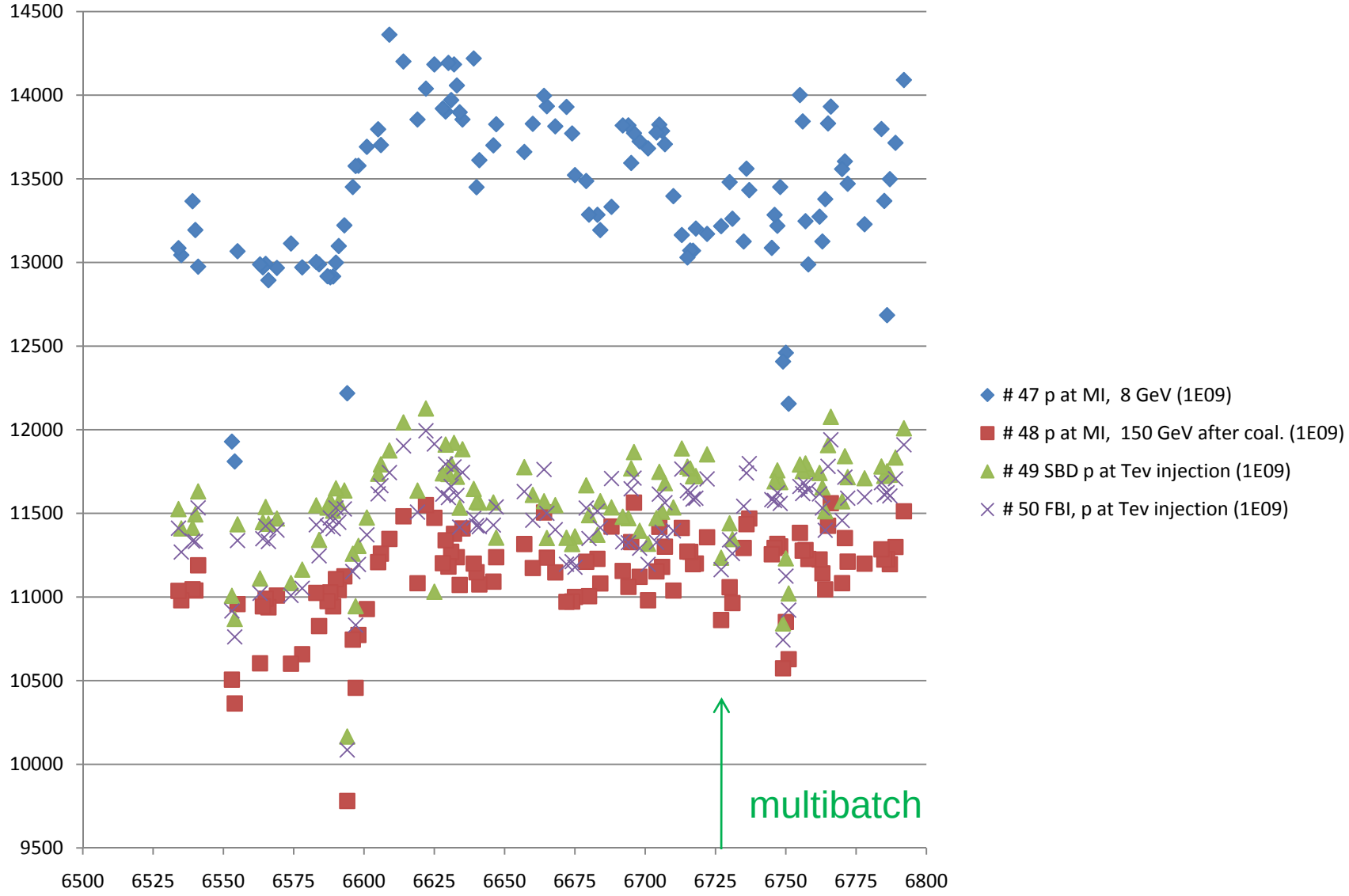


MI proton coalescing efficiency vs proton intensity (e9) at MI 8 GeV

Jan. 13, 2009 – Feb. 10, 2009/multibatch operation

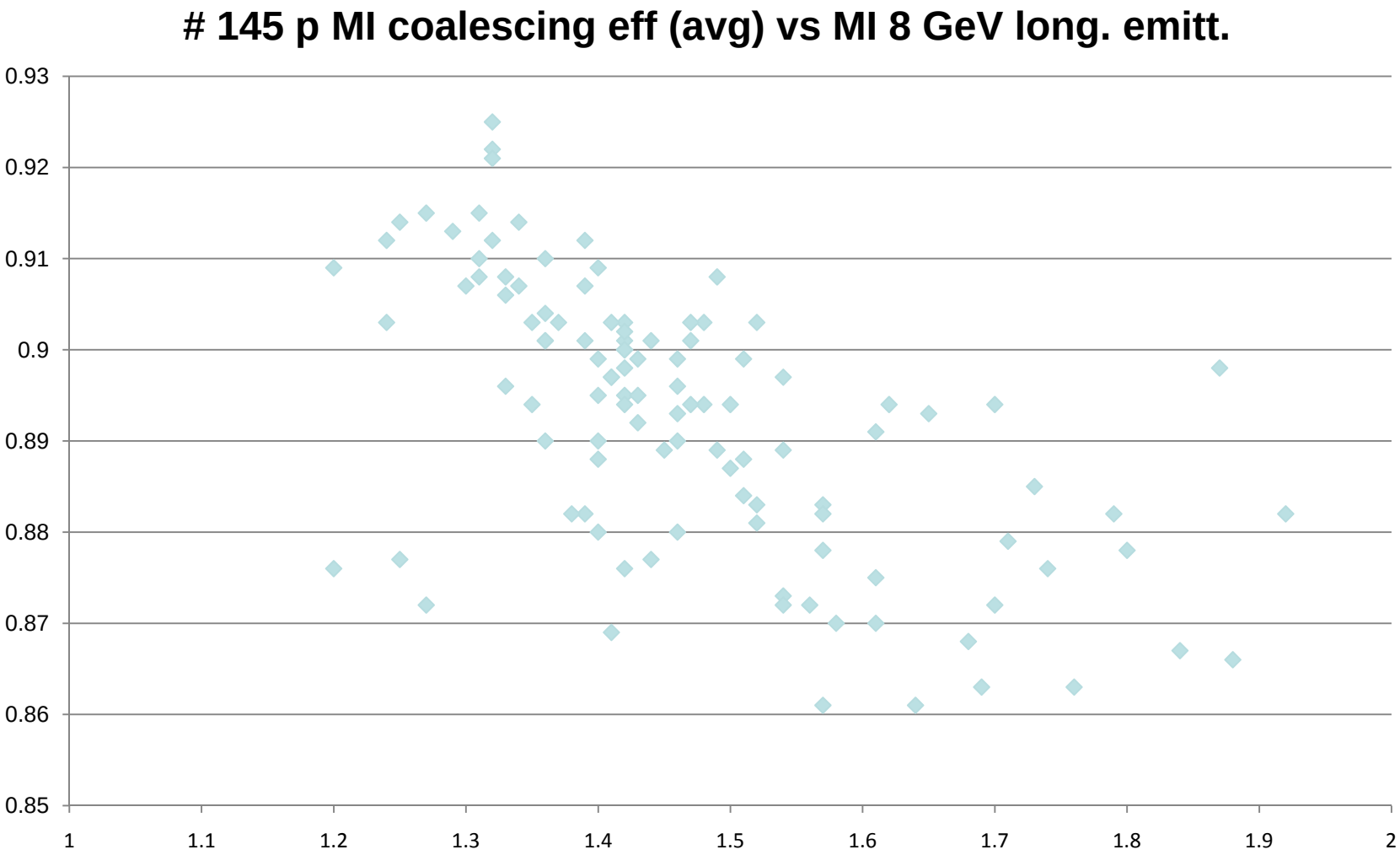


MI proton and TeV 150 GeV intensities

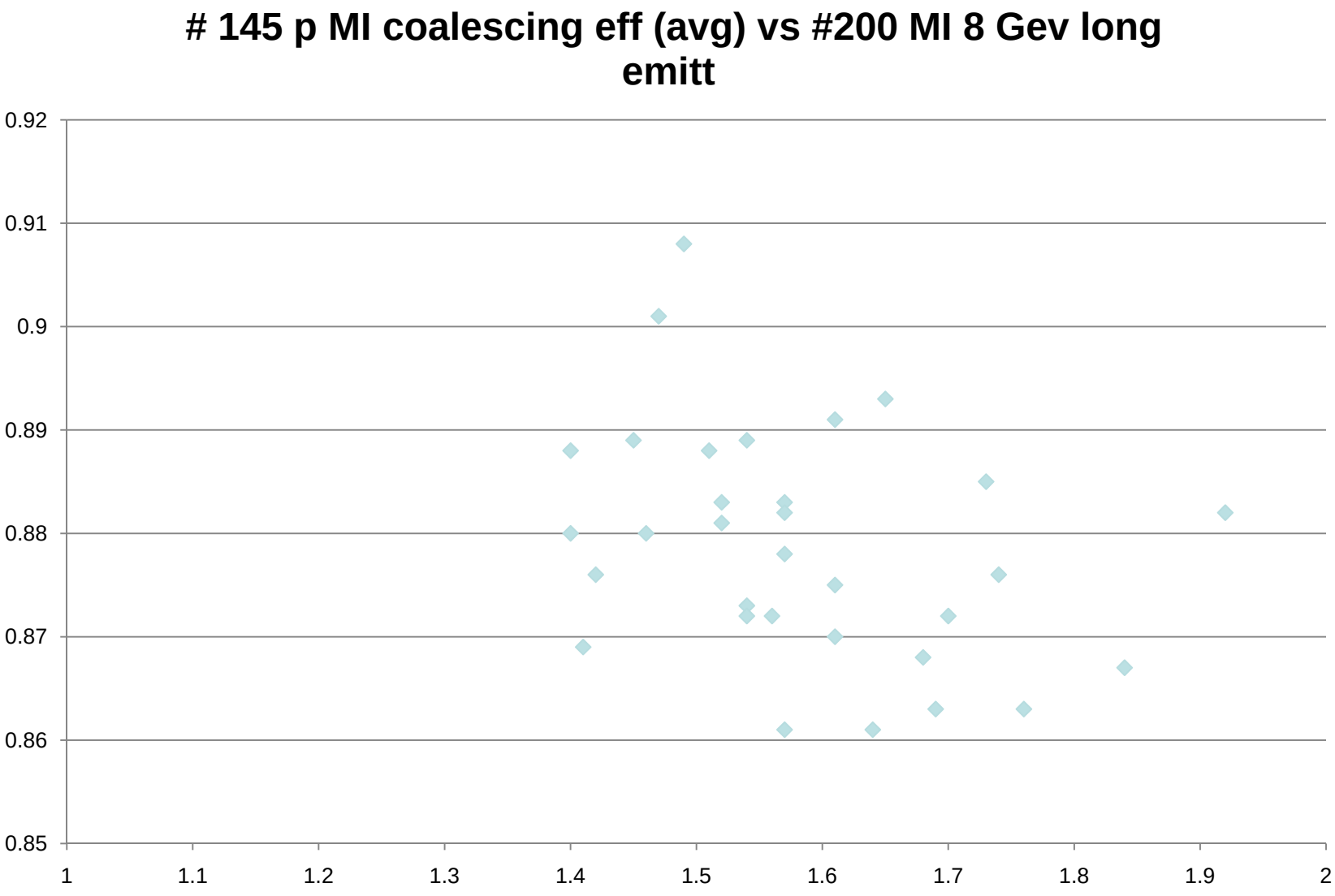


MI proton coalescing eff. vs 8 GeV proton longitudinal emittance

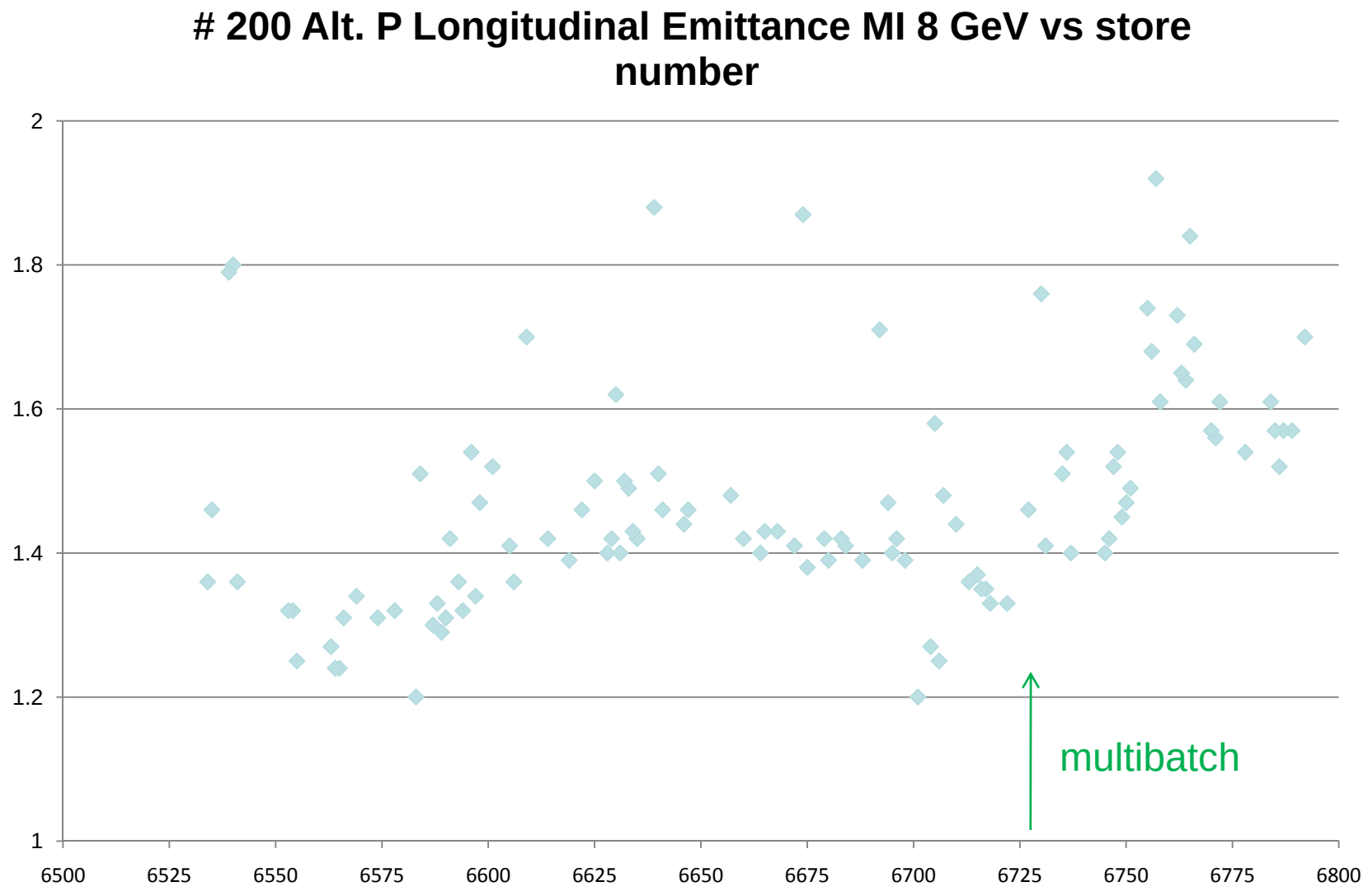
Nov. 1, 2008 – Feb. 10, 2009



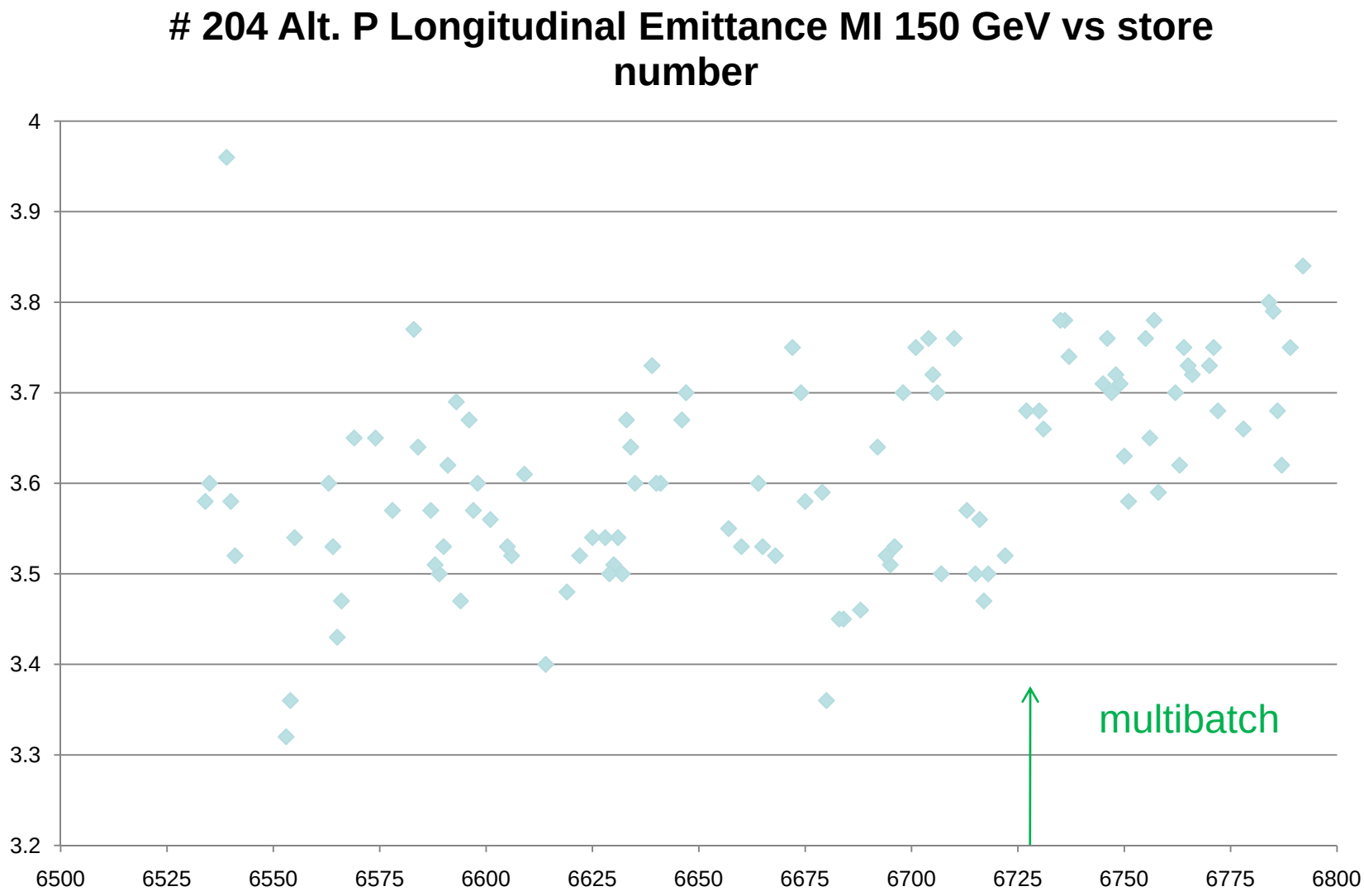
MI proton coalescing eff. vs 8 GeV longitudinal emitt. after multibatch operation



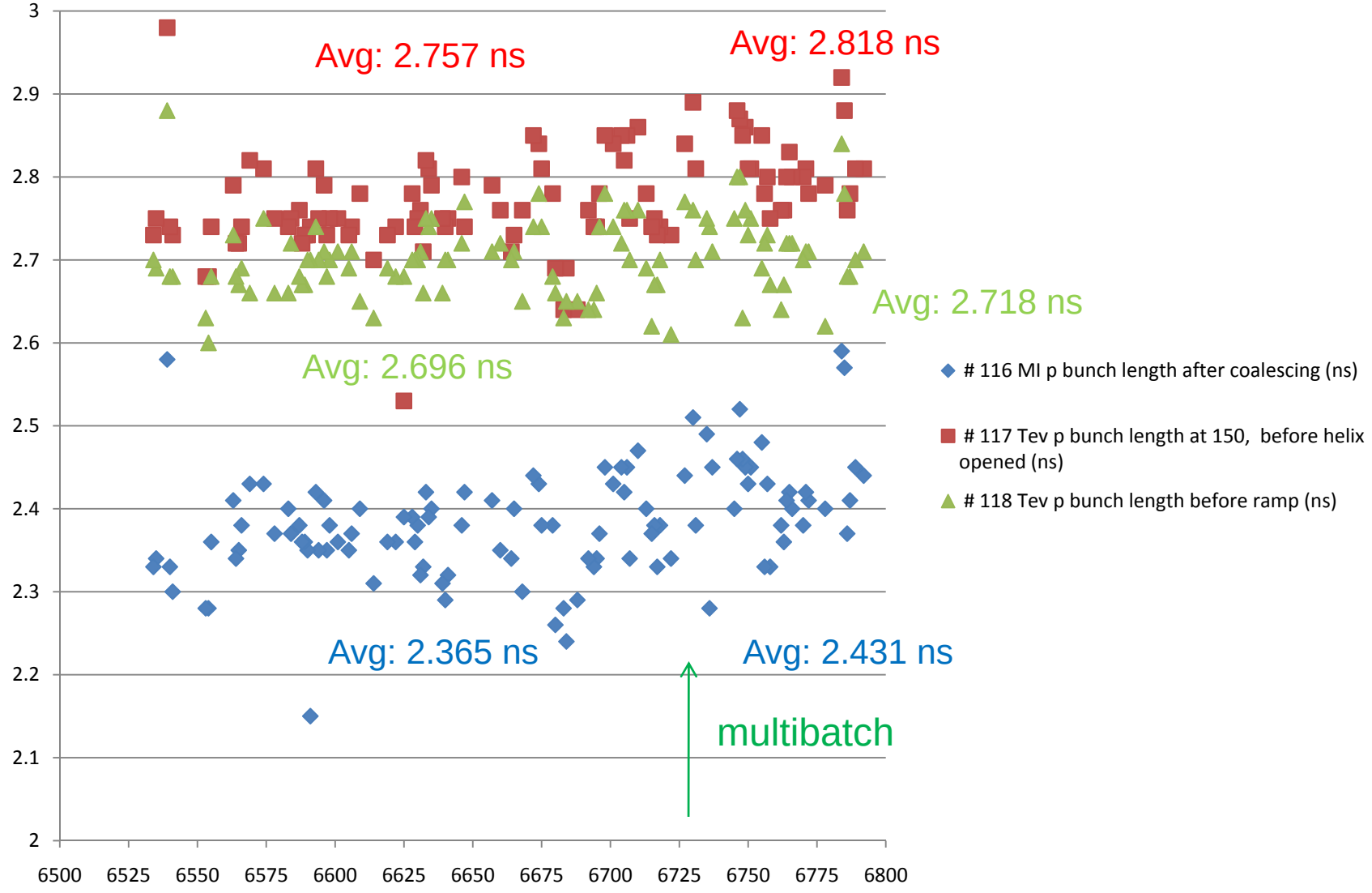
MI proton longitudinal emittance at 8 GeV
Nov. 1, 2008 – Feb. 10, 2009



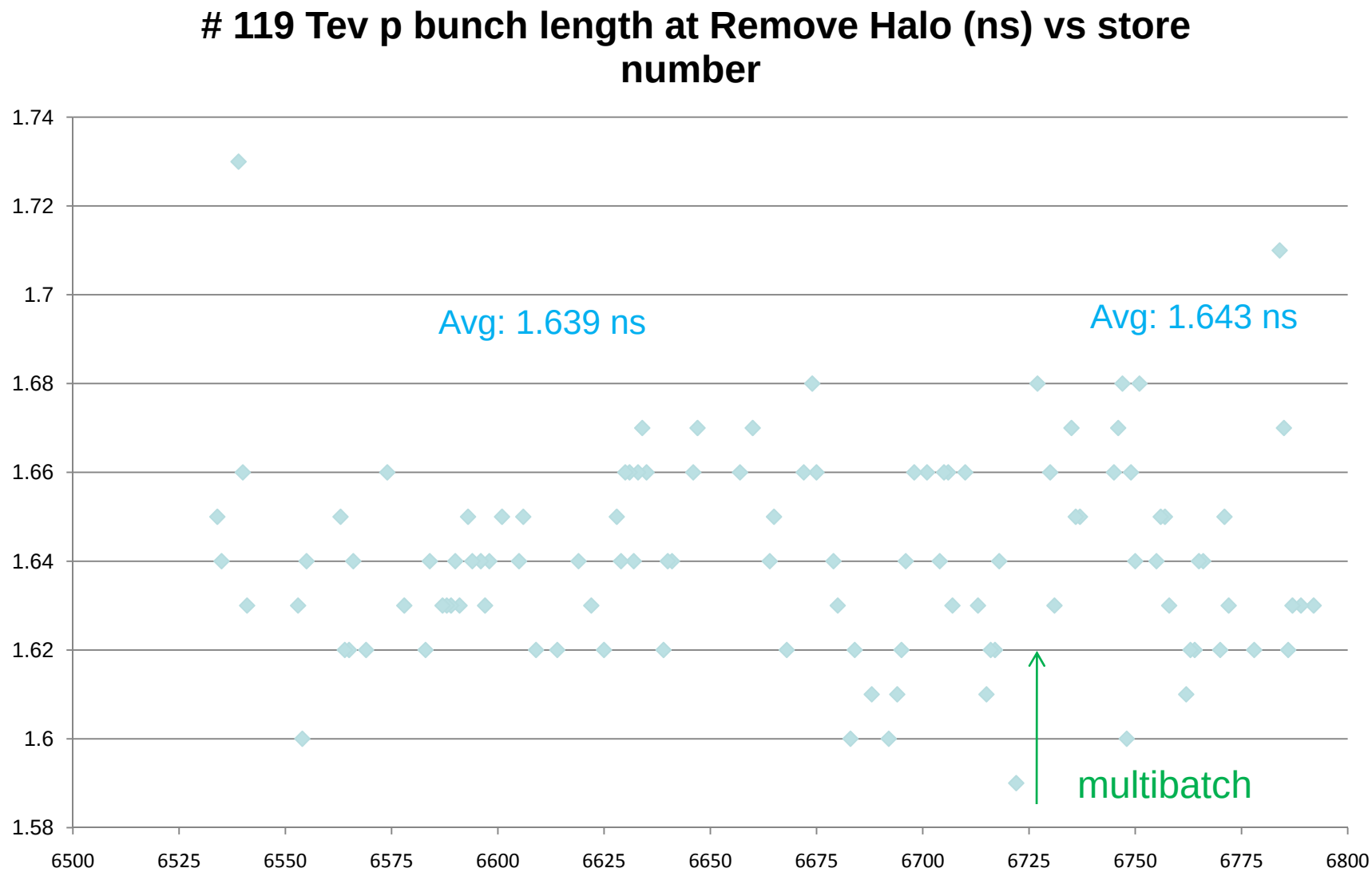
MI proton longitudinal emittance at 150 GeV
Nov. 1, 2008 – Feb. 10, 2009



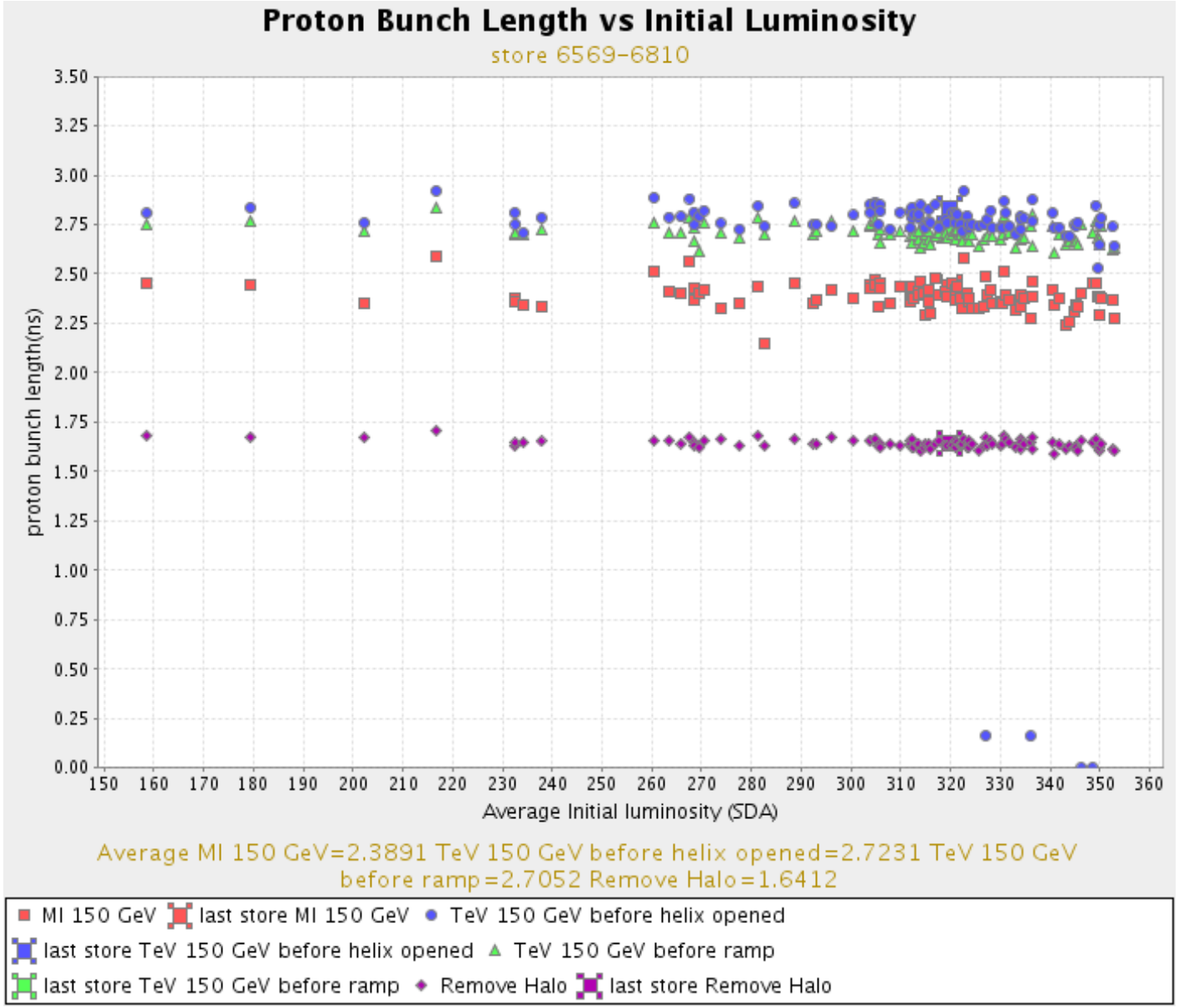
proton bunch length at 150 GeV



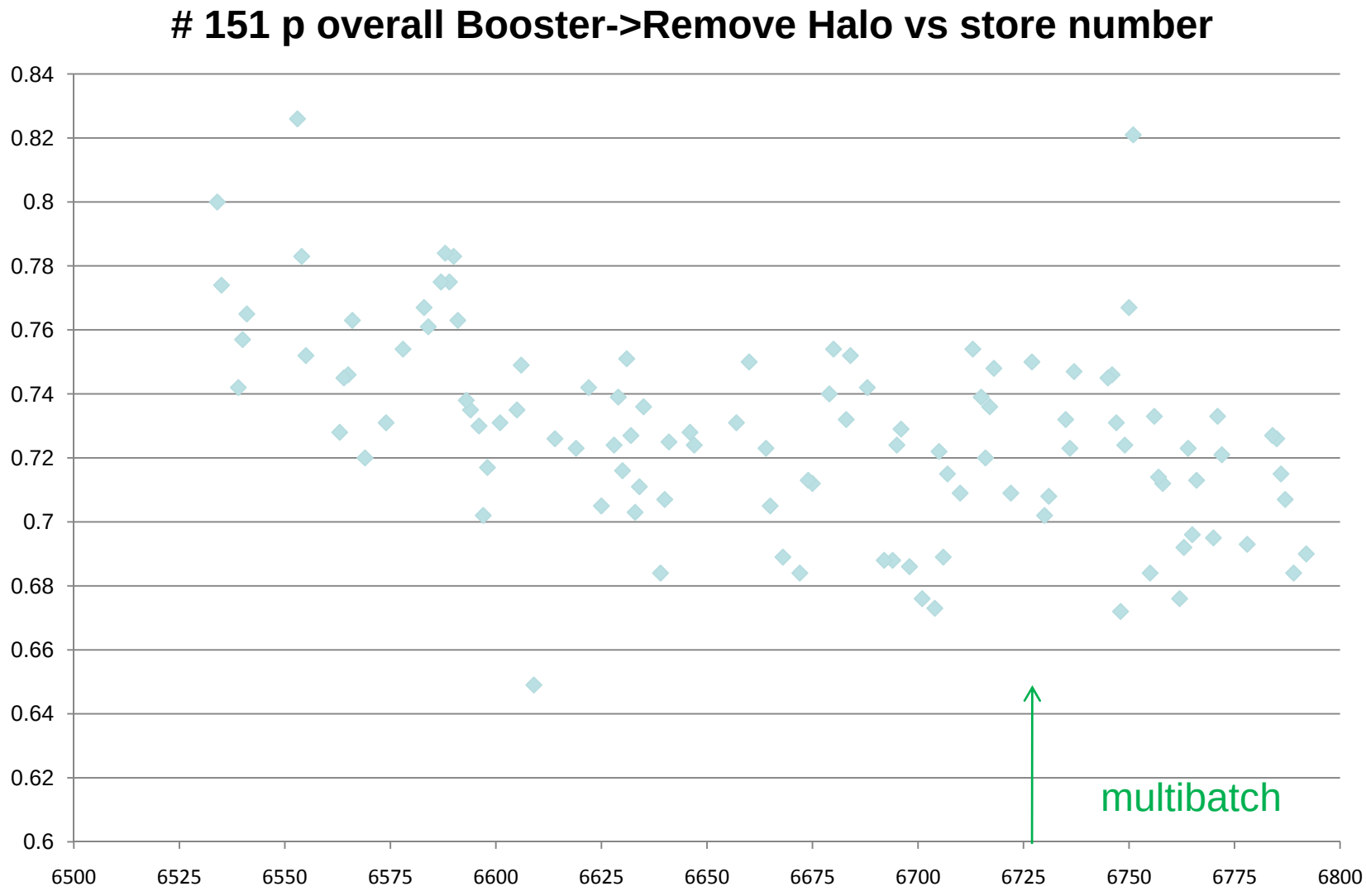
proton bunch length at Remove Halo



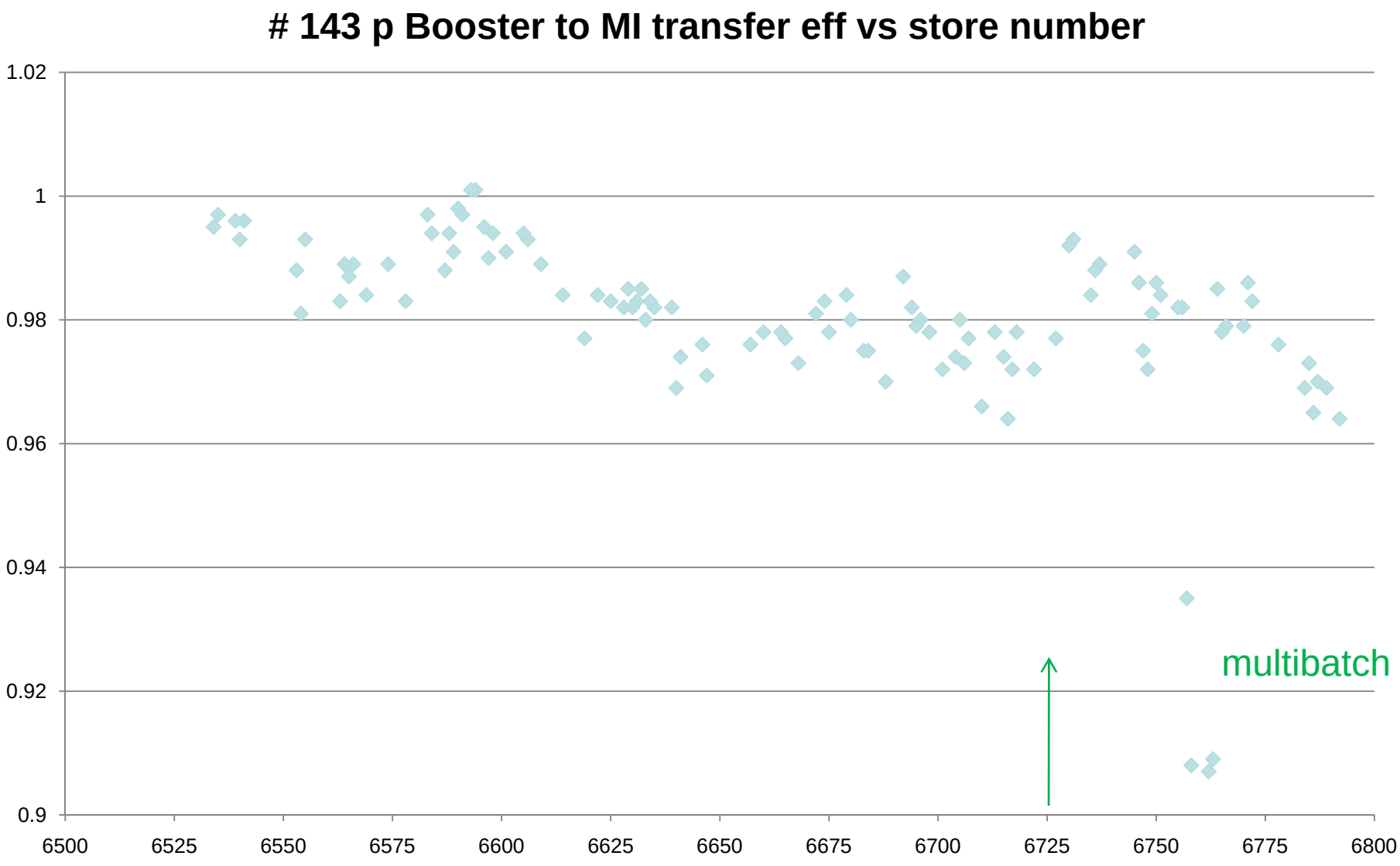
proton bunch length at 150 GeV vs initial luminosity



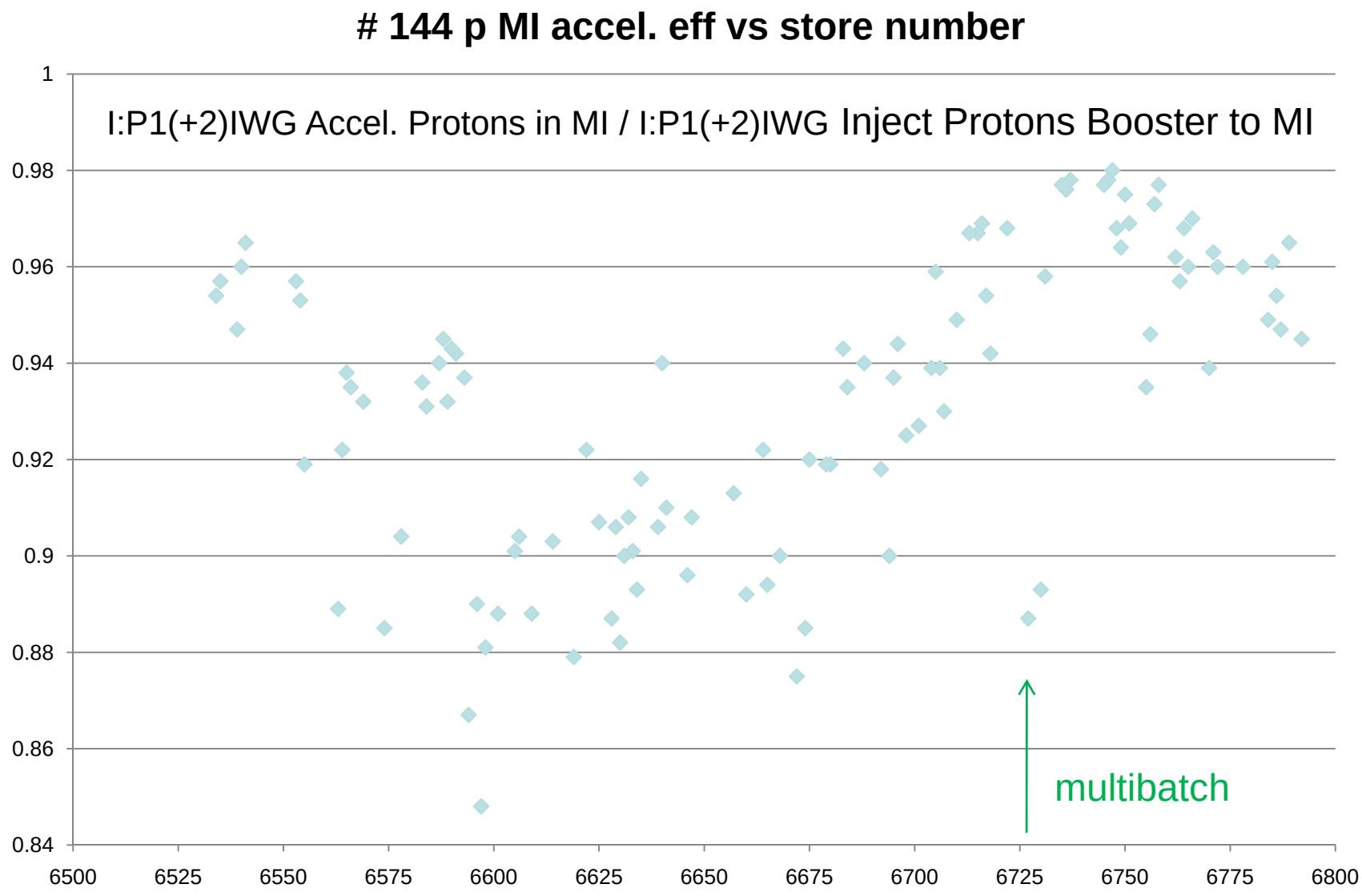
Efficiencies
Nov. 1, 2008 – Feb. 10, 2009



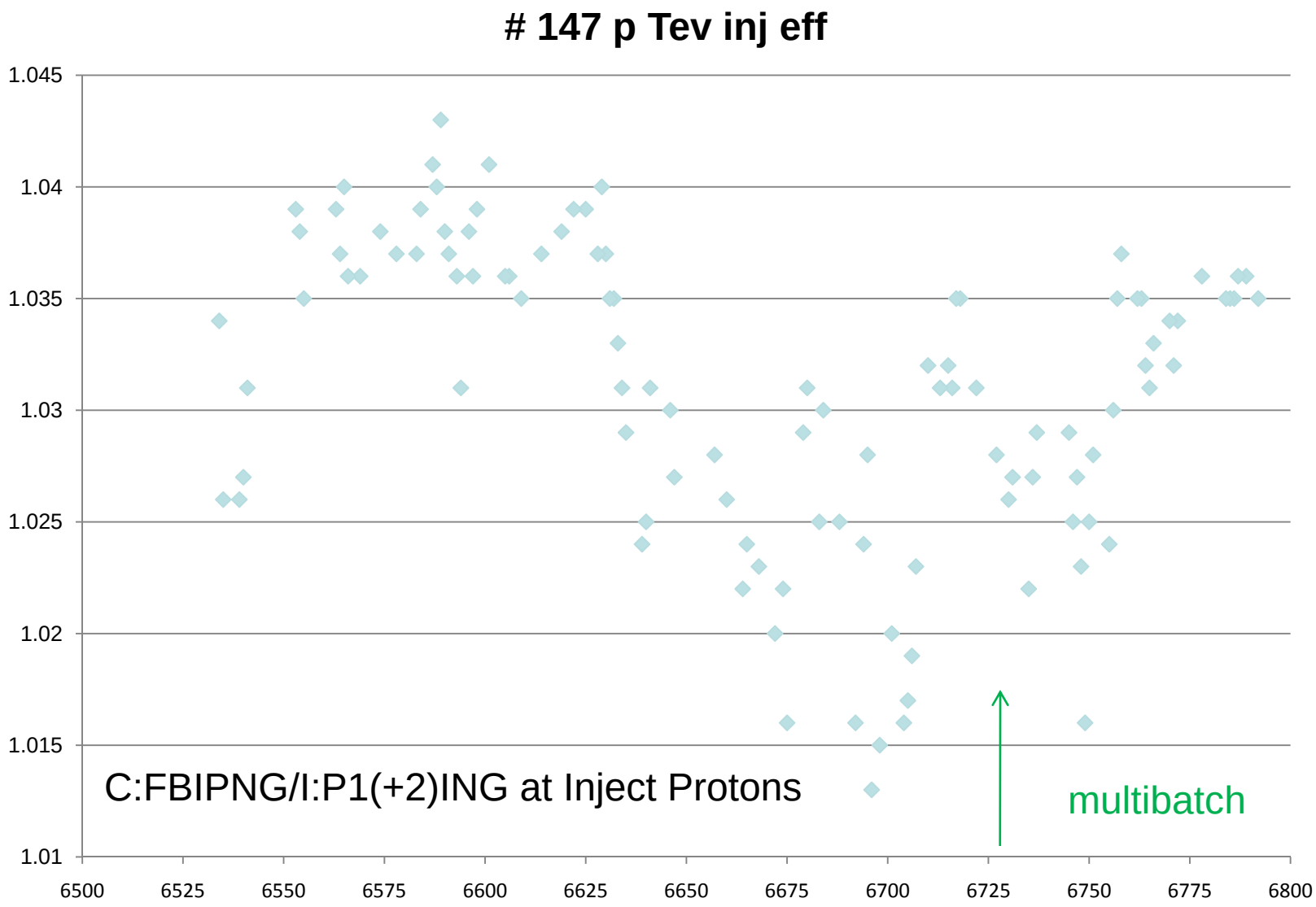
Efficiencies



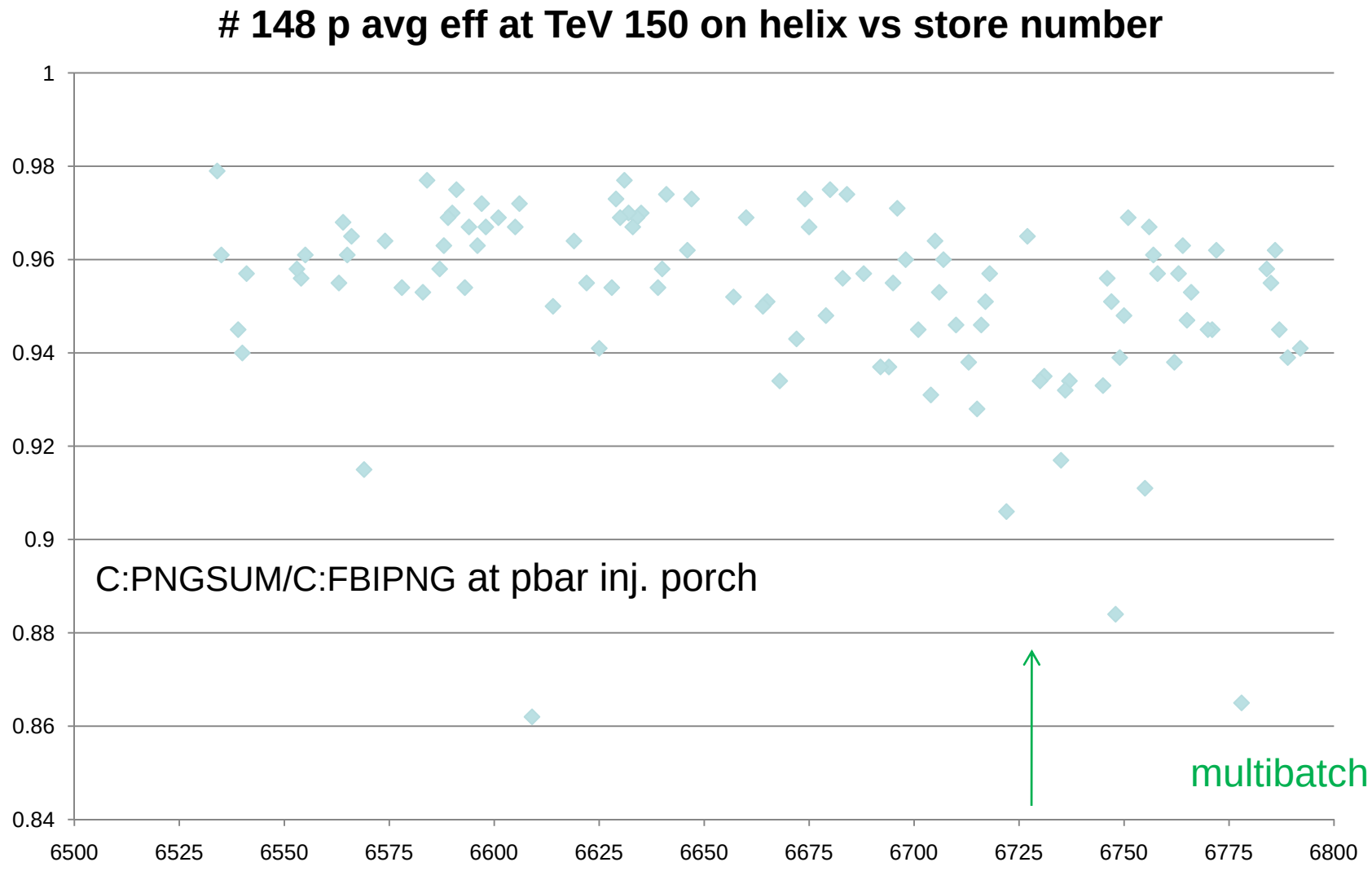
Efficiencies



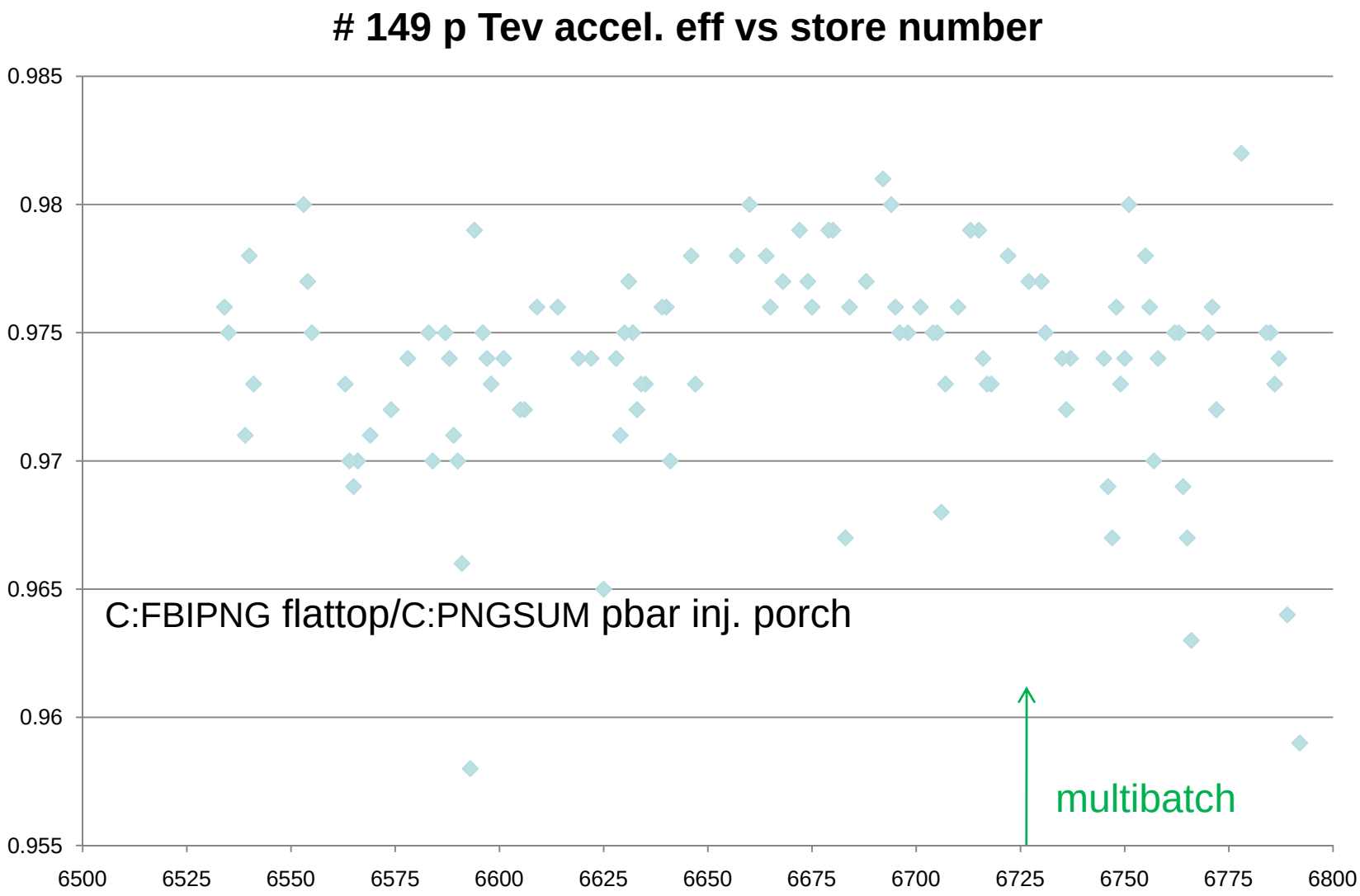
Efficiencies



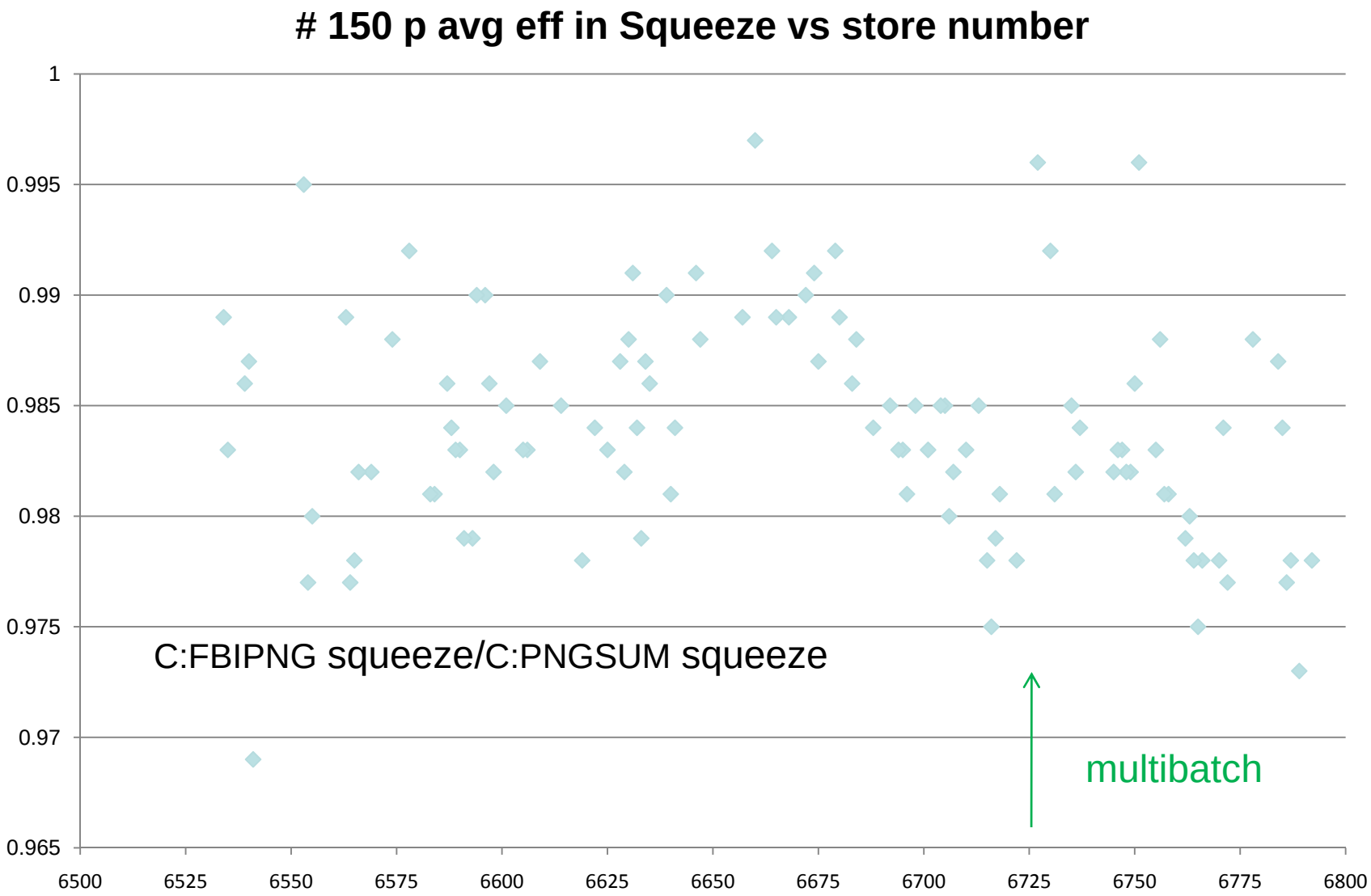
Efficiencies



Efficiencies

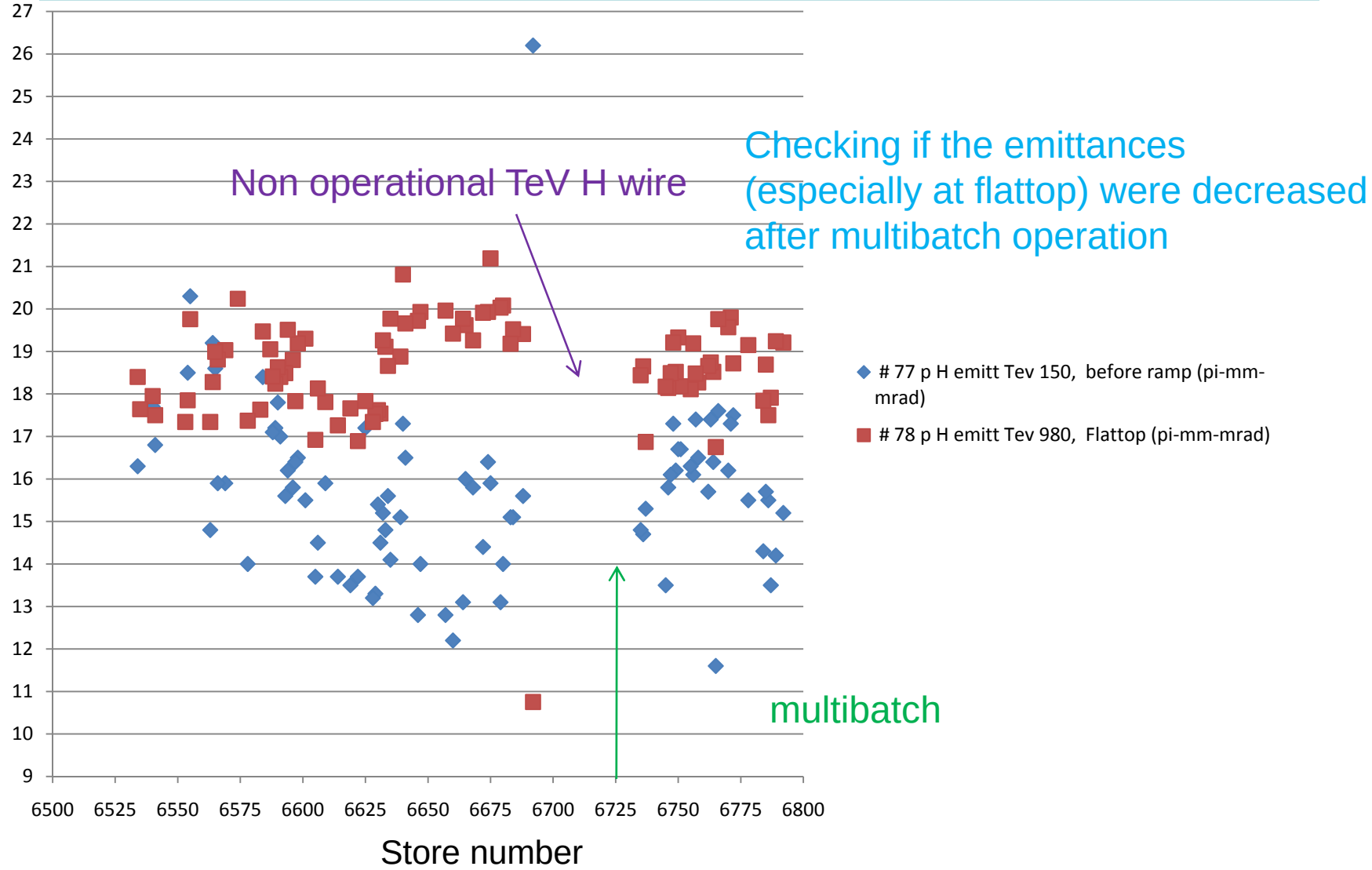


Efficiencies



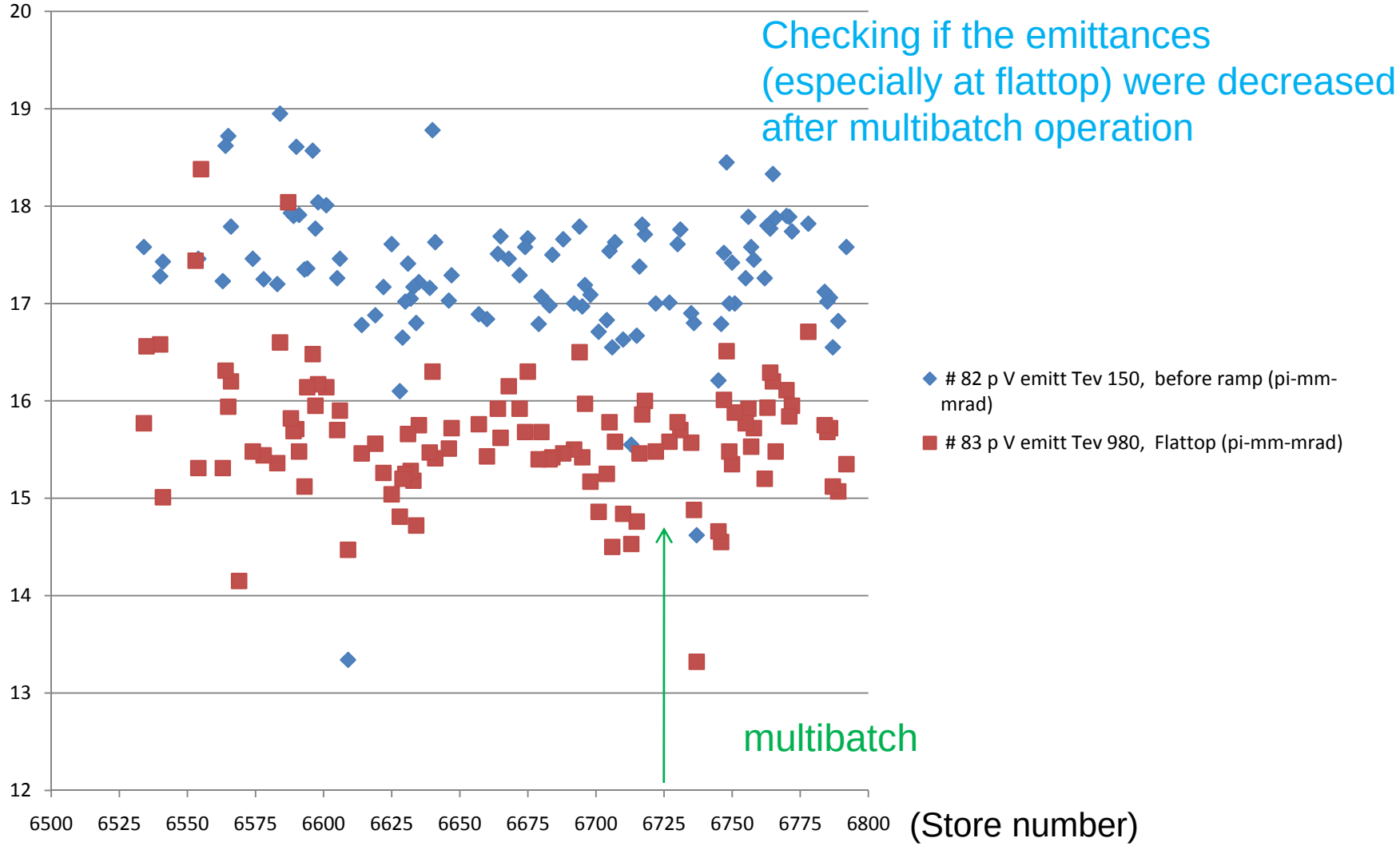
Tevatron (150 GeV and flattop) proton horizontal emittance

Nov. 1, 2008 – Feb. 10, 2009



Tevatron (150 GeV and flattop) proton vertical emittance

Nov. 1, 2008 – Feb. 10, 2009



Conclusions

Stores between November 1, 2008 and February 10, 2009 have been examined in more detail for the proton MI coalescing efficiency and any possible correlations.

From around mid November, 2008 and on there is a slope downward to the proton MI coalescing efficiency.

There is a definite (and expected) anti-correlation with proton intensity but in the above period the stores lie on two different slopes, with the later stores mostly on the steeper slope.

There is a definite anti-correlation as well with the proton longitudinal emittance at 8 GeV.

There is an increase on proton 8 GeV longitudinal emittance

Conclusions

for the past ~20 stores. The scatter in the 150 GeV longitudinal emittance is bigger, but there is an increase there as well.

It would be interesting to see recent emittance history as well for the Booster.

There is a step downward on horizontal flattop emittances after the fixing of the horizontal TeV wire. The wire became operational again after proton multibatch operation had started. Shot setup times though did not get decreased significantly till recently, so it is quite possible the decrease is independent of the duration of the shot setup. There is no obvious trend visible for the vertical flattop emittance during multibatch operation. More study is needed to check if the decrease in shot setup duration decreases vertical emittances as well.

Conclusions

Several additional proton efficiencies have been examined as well. Some of them exhibit interesting structure over the period of the three and a half months.