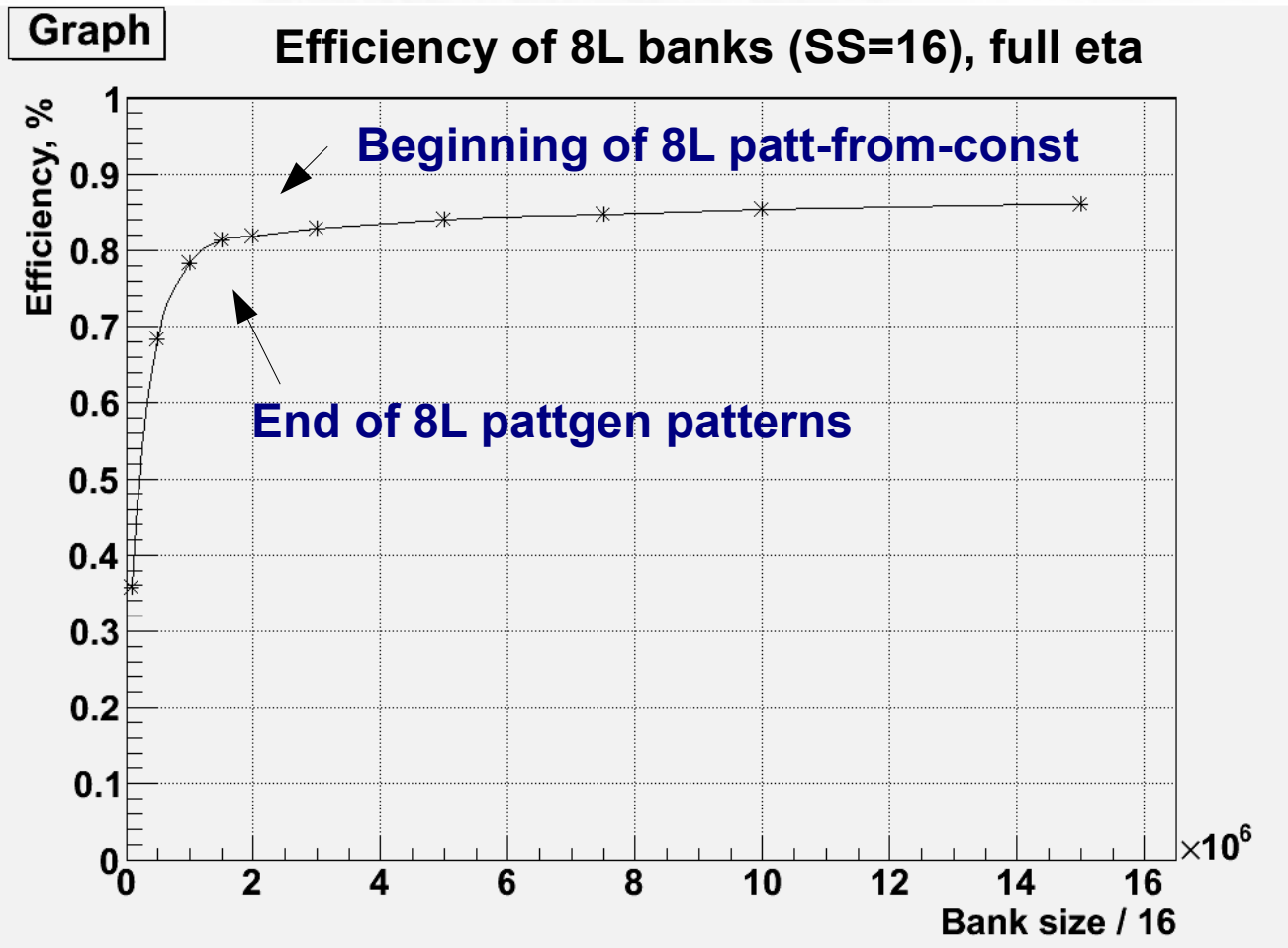


# New features

- I committed a few new options to TrigFTKLib:
- 8L bootstrapping from 11L (can be extended to other small-layer architectures)
- Ability to force specific random seed in pconst
- Ability to explicitly cut on chi2 in pconst
  - If constraints have bad chi2, regenerate them
- Ability to choose pconst overlap removal algo
  - 1 = old algorithm (removes overlapping phi modules in the barrel)
  - 2 = new Joe's algorithm (includes above, plus overlaps in forward modules)

# 8L patt-from-const

- Recall: 8L patt-from-const are really crappy
- Reason: multiple sector fake matches
- This is fixed now: via bootstrapping from 11L



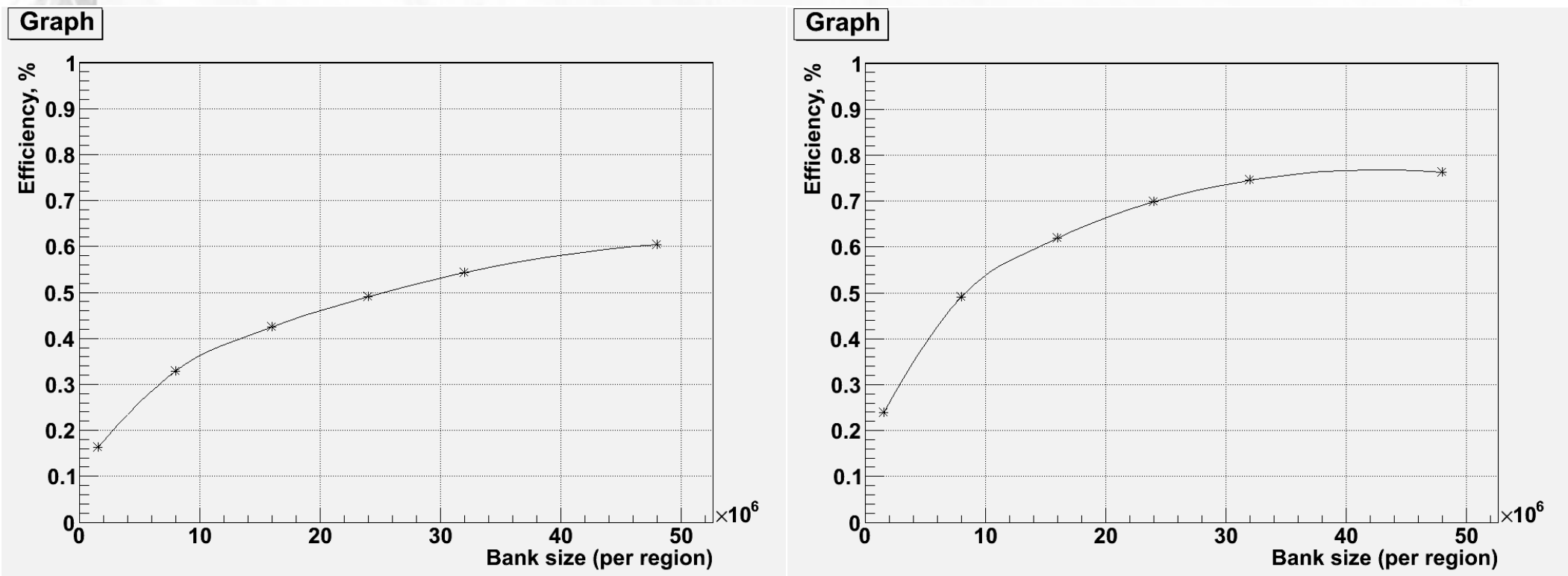
Last week's plot:

# Default 8L pconst vs 11L bootstrapping

Generated in similar conditions: -n200M (200 million iterations); same random seed.  
The plots below exclude pattgen patterns – we are only looking at patt-from-const!  
The plots are over full eta.

Default 8L pconst (total=160M/reg)

Bootstrapped 8L pconst (total=45M/reg)

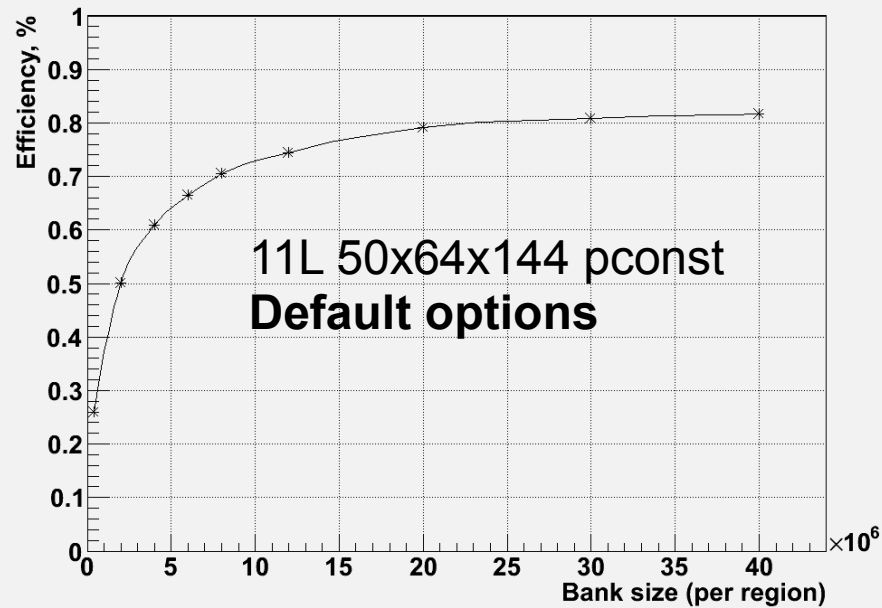


**Default 8L pconst** produced a lot of garbage patterns. The left plot shows that even after cutting away the bottom 110M, the remaining 45M patterns are rather crappy.

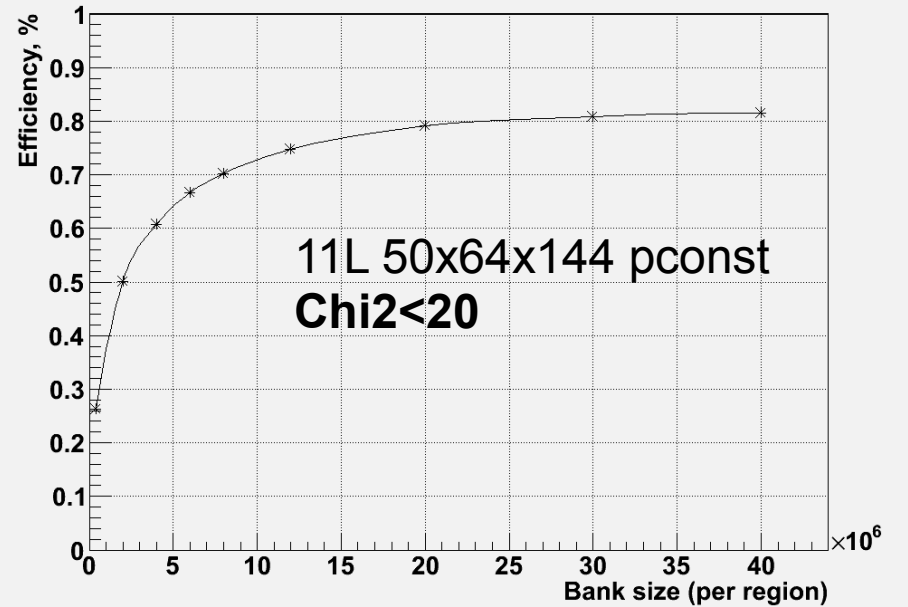
**Bootstrapped 8L pconst** look good. Note that the right plot loads all available patterns (i.e. no cutting is done from the bottom). If we ran more MC, the can further improve the quality of these patterns!

# New options have negligible effect

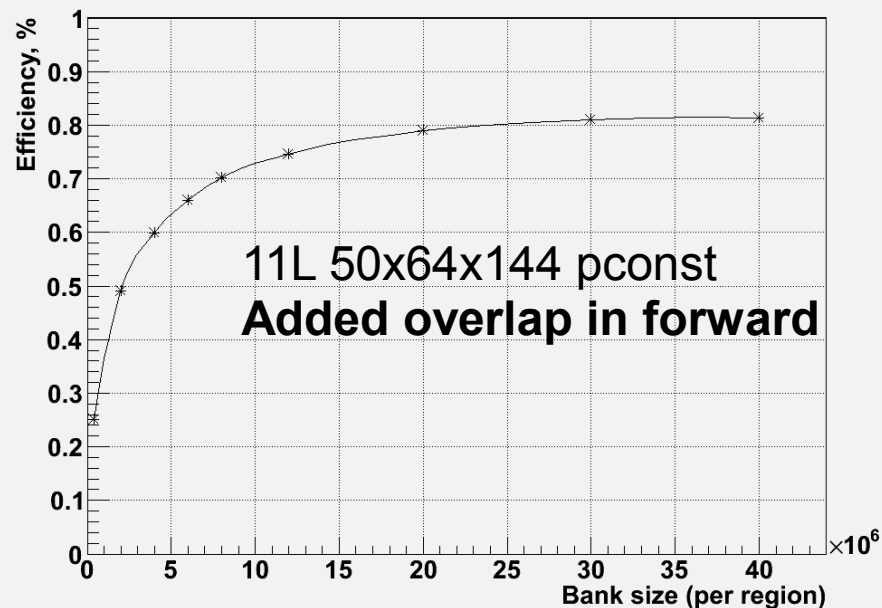
Graph



Graph



Graph



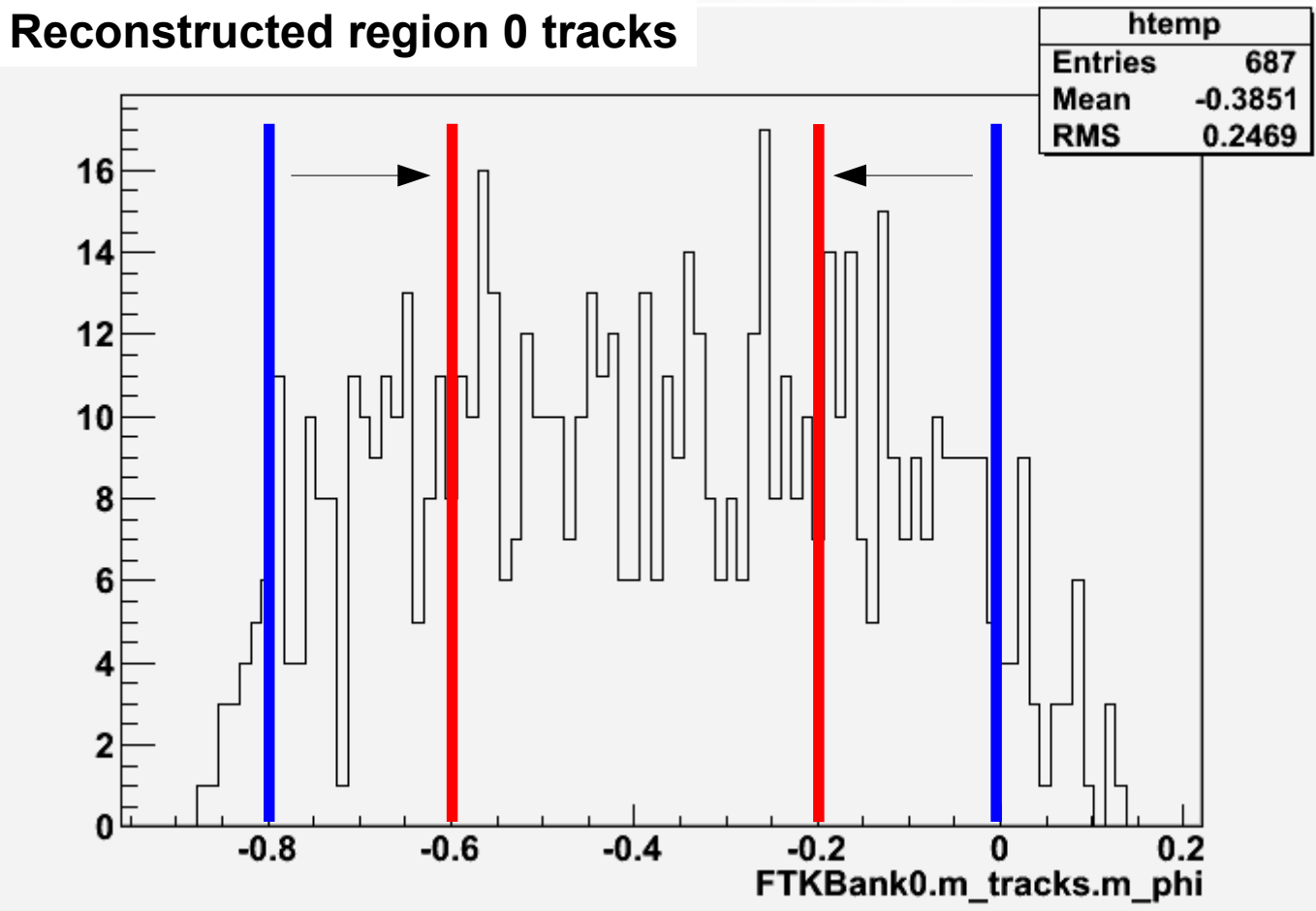
All plots are over **full eta**

At least for wide 11L superstrips, there is no discernible difference in using a chi2 cut of additional forward-region overlap removal.

In fact, the default patt-from-const are the best of all (but only by 0.5%)

# Efficiency denominator

We measure efficiency in region 0 only (since it is faster). For that, we used a subset of truth tracks with  $\phi=(-0.8..0.0)$ . But this cut introduced edge effects. With the new cut, we recover 5% - 6% in efficiency



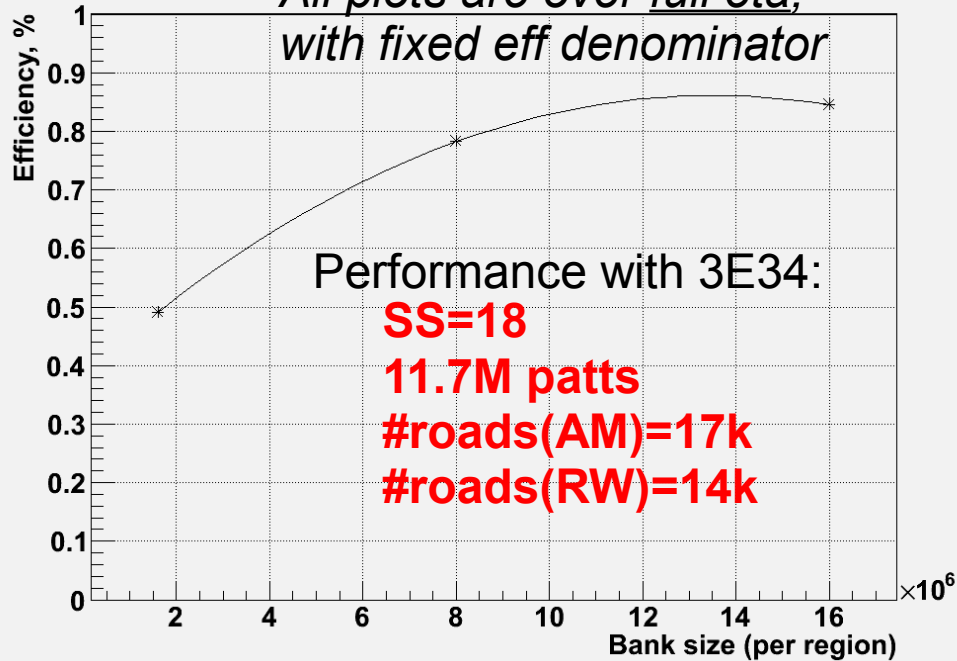
- Blue line** Old range for truth track phi (denominator in efficiency)
- Red line** New range for truth track phi (denominator in efficiency)

ALL PLOTS BELOW USE THE FIXED PHI RANGE

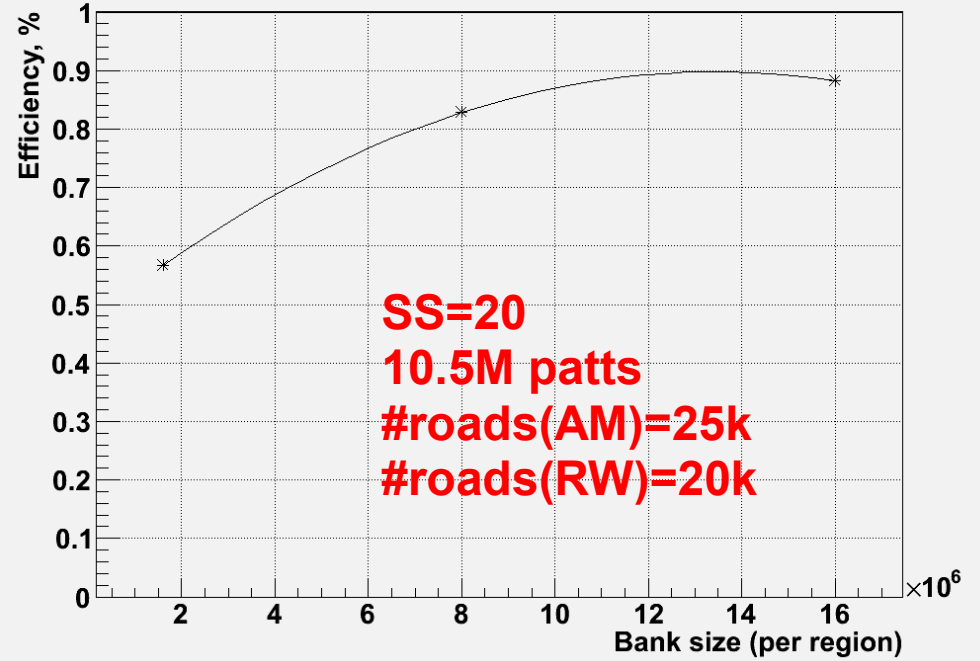
# 8L efficiency curve vs SS (pattgen only)

Graph

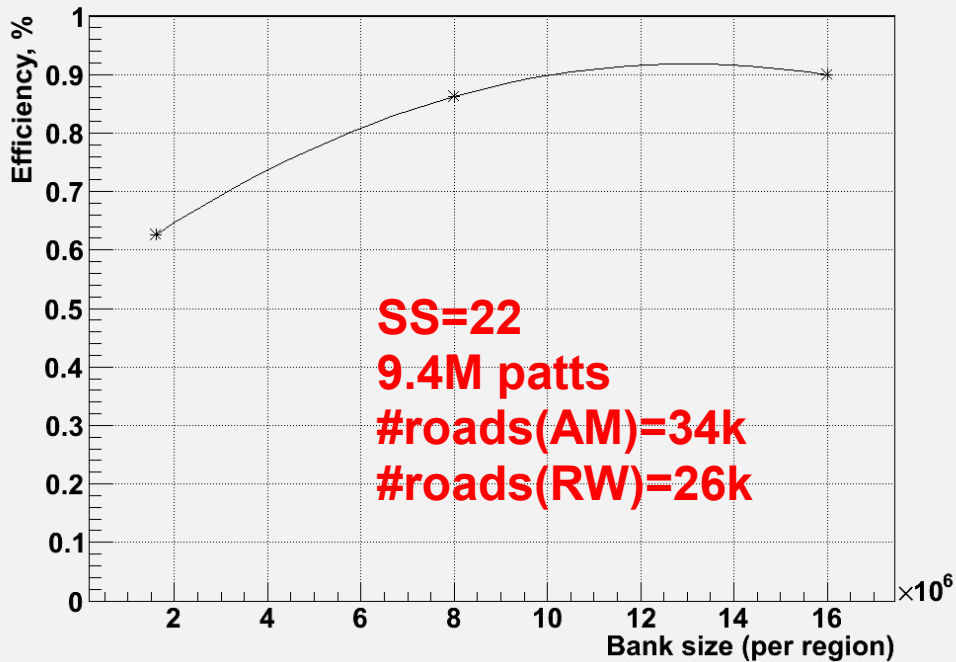
*All plots are over full eta;  
with fixed eff denominator*



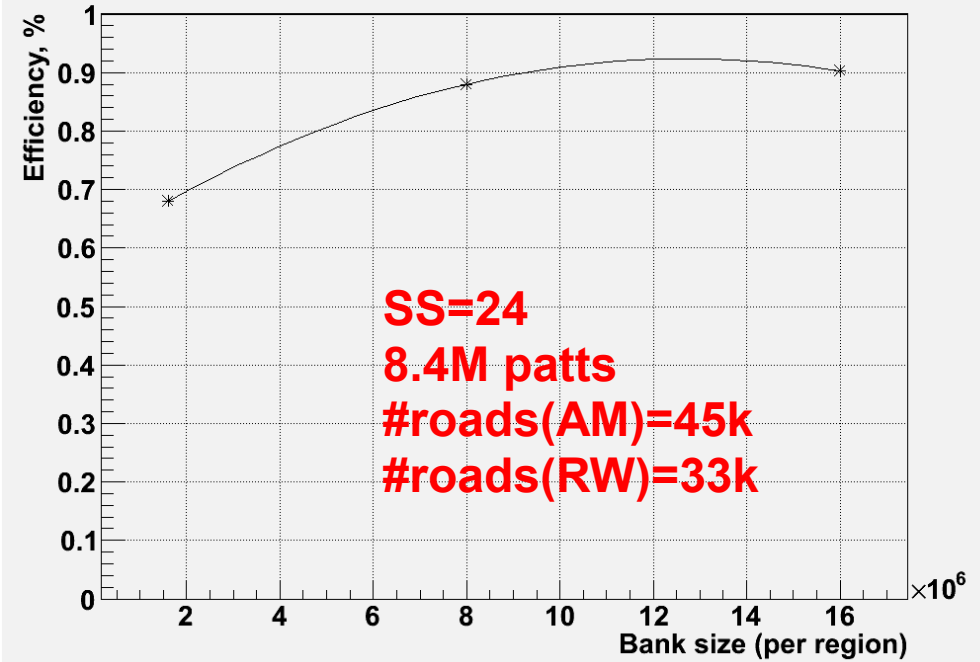
Graph



Graph



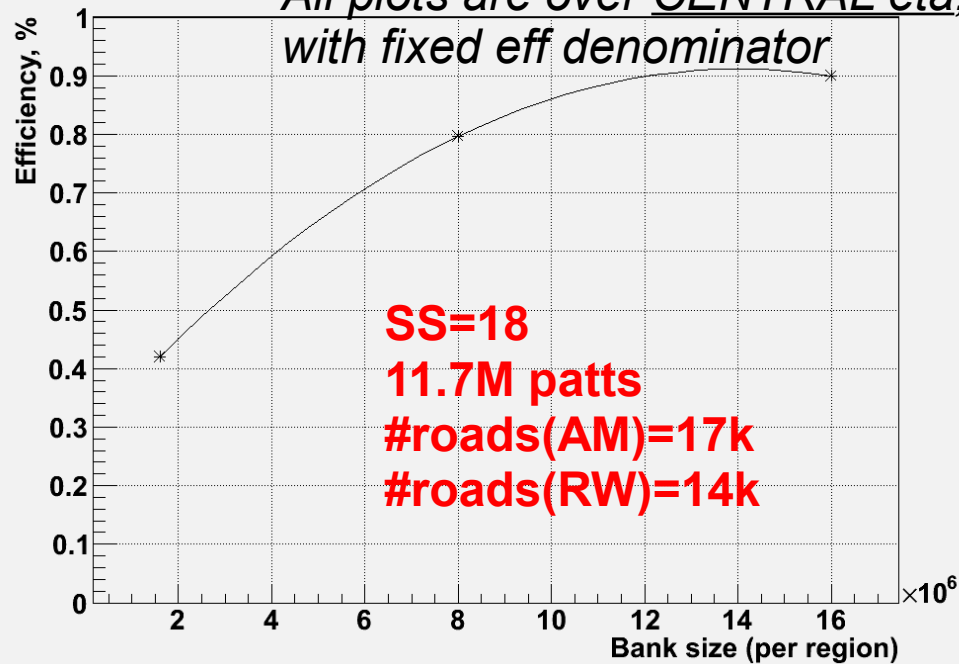
Graph



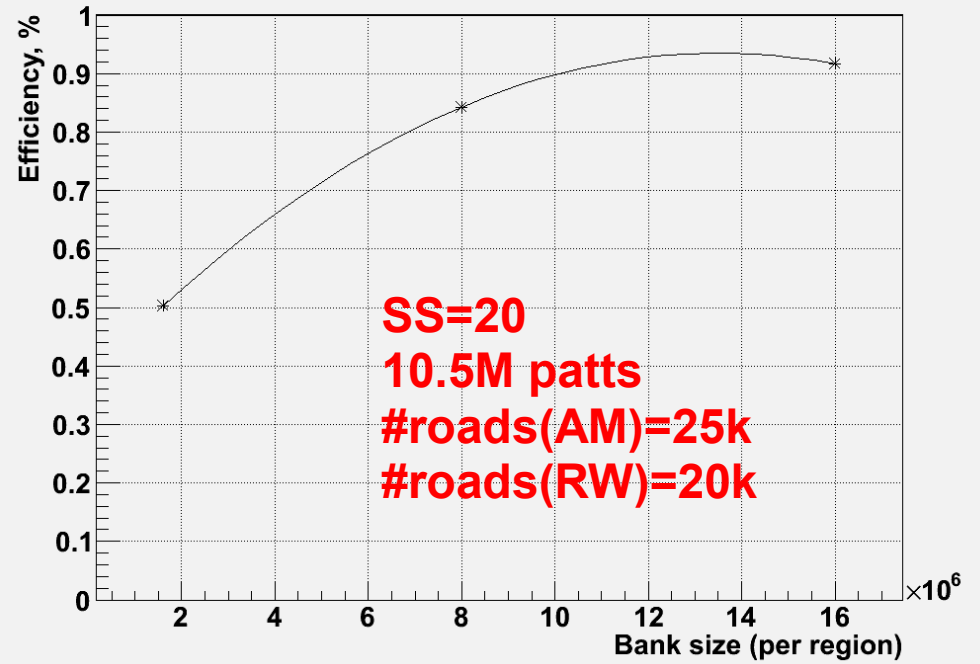
# 8L efficiency curve vs SS (pattgen only, central)

Graph

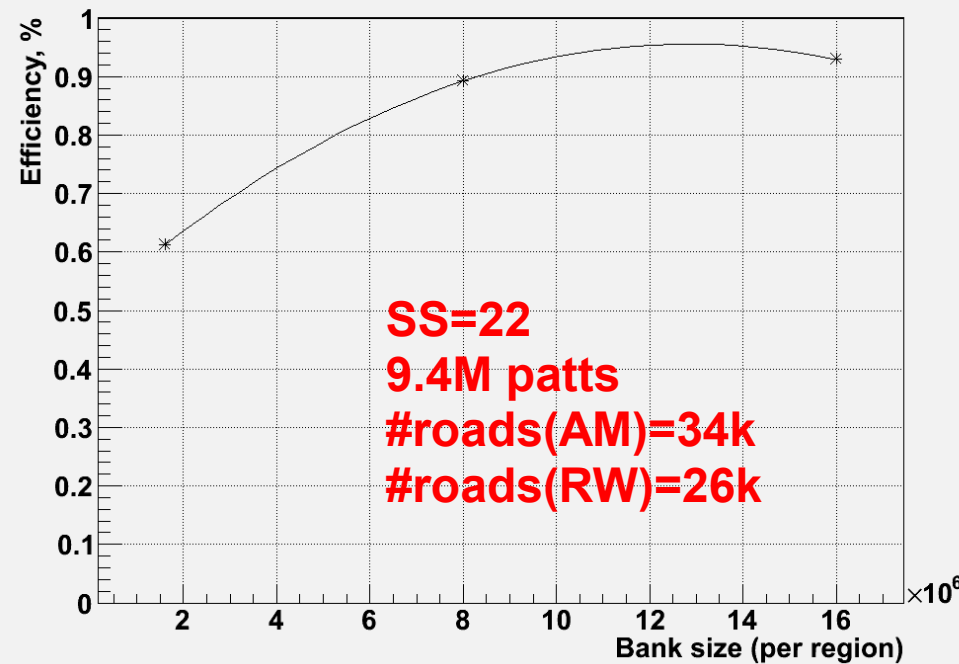
All plots are over CENTRAL eta;  
with fixed eff denominator



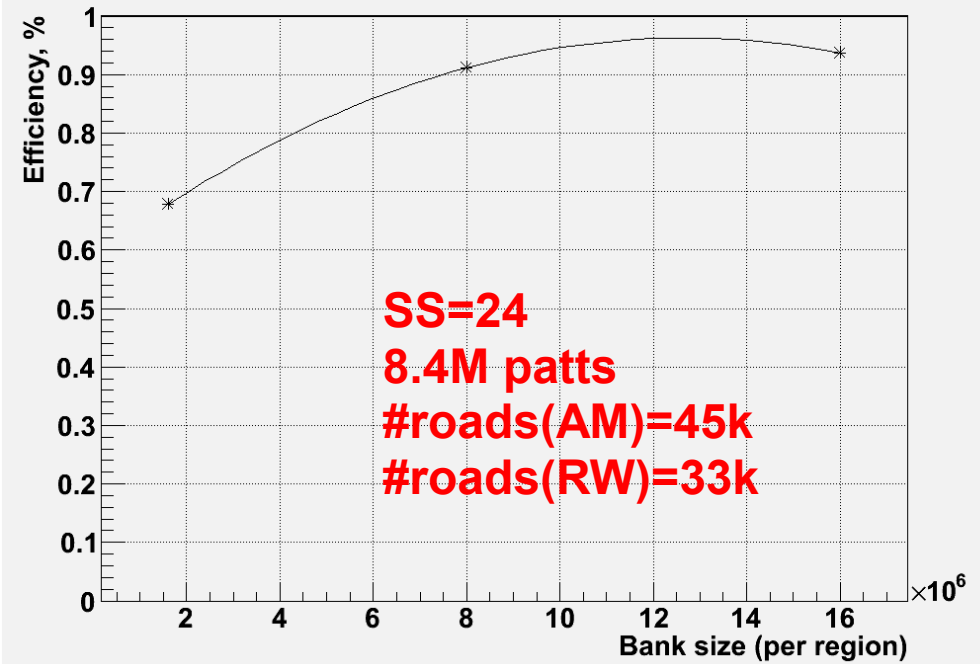
Graph



Graph



Graph

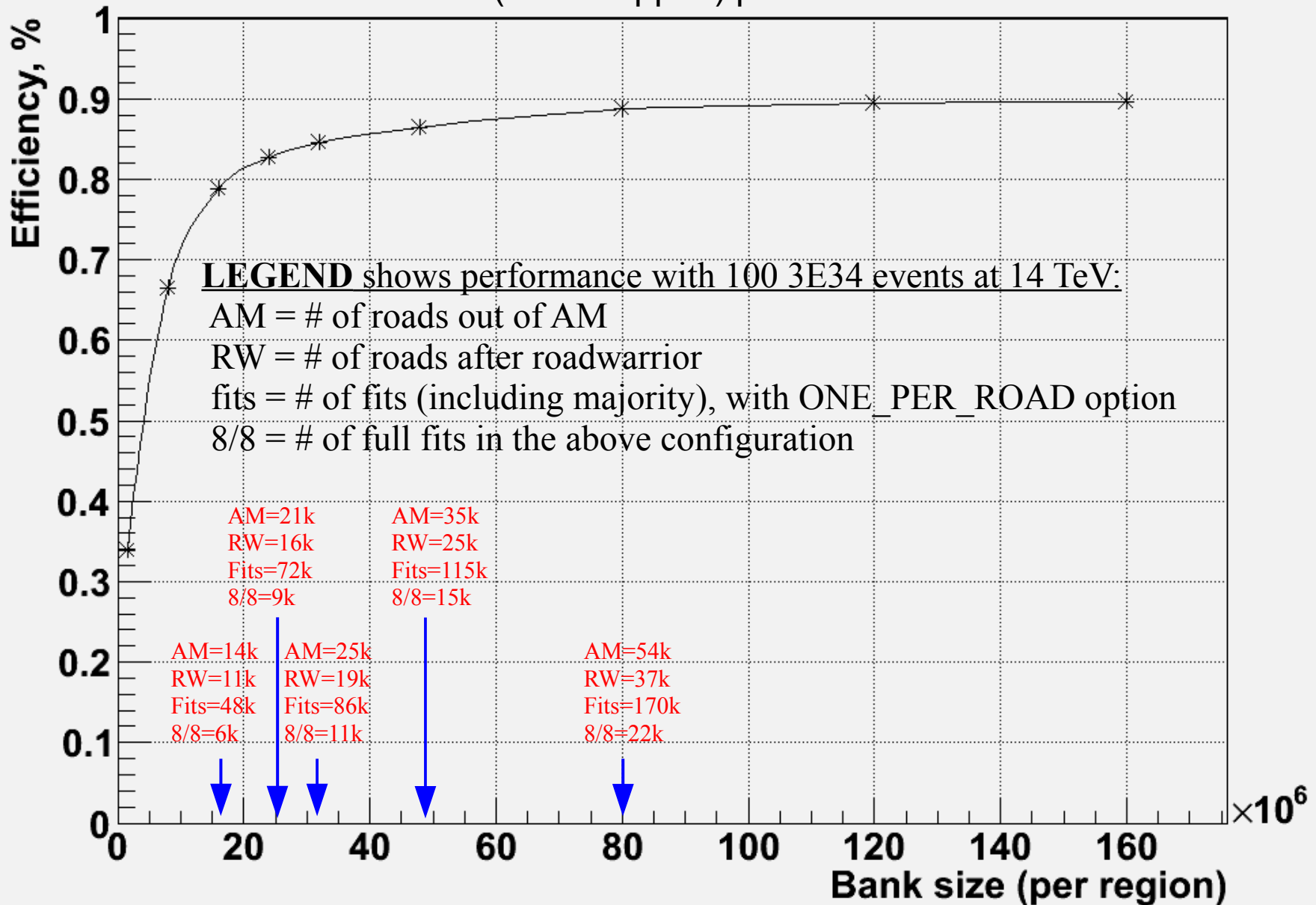


# 8L SS=16 best patterns (full eta)

**Graph**

Fixed efficiency denominator

Good (bootstrapped) patterns-from-constants

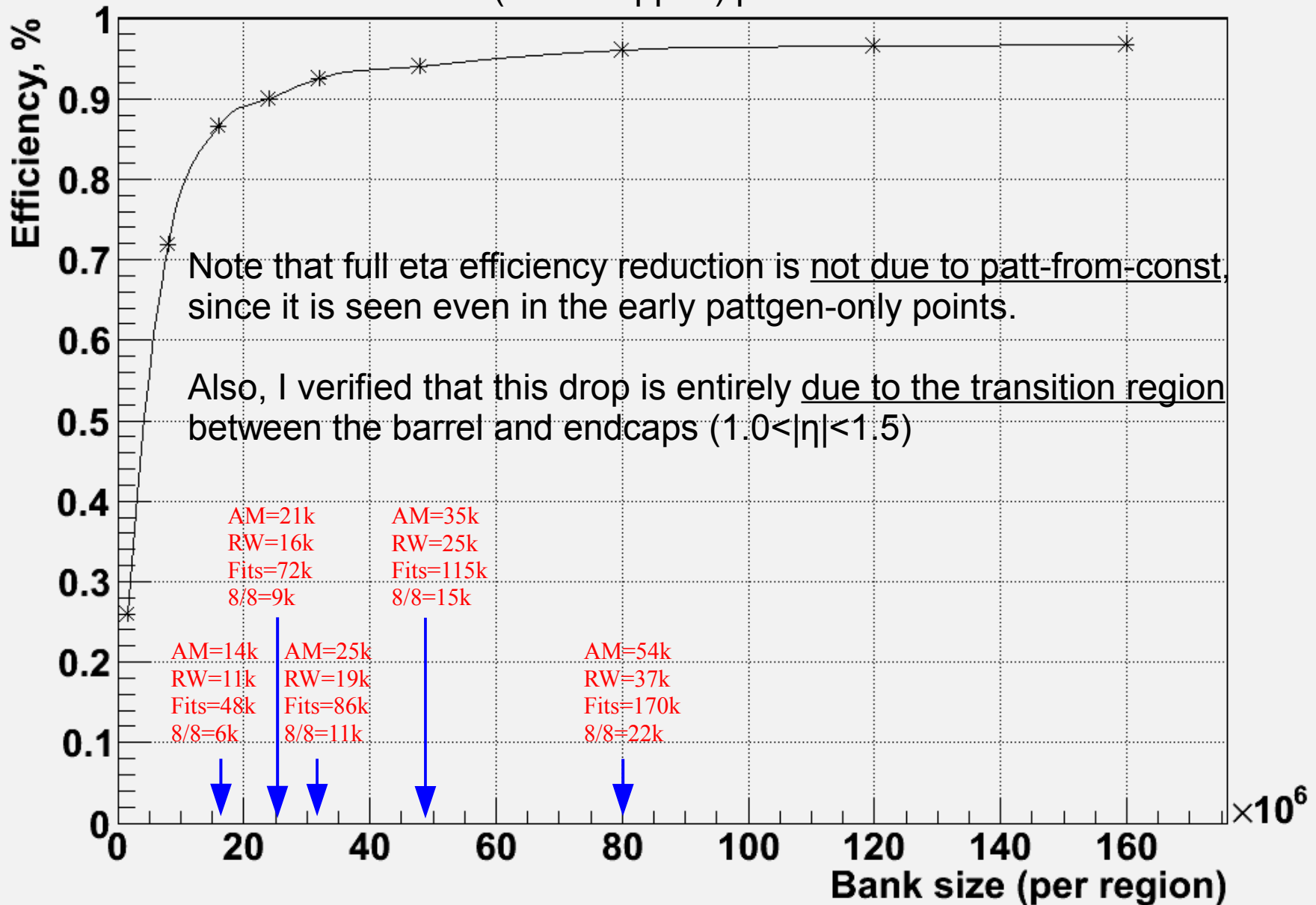


# 8L SS=16 best patterns (central)

## Graph

Fixed efficiency denominator

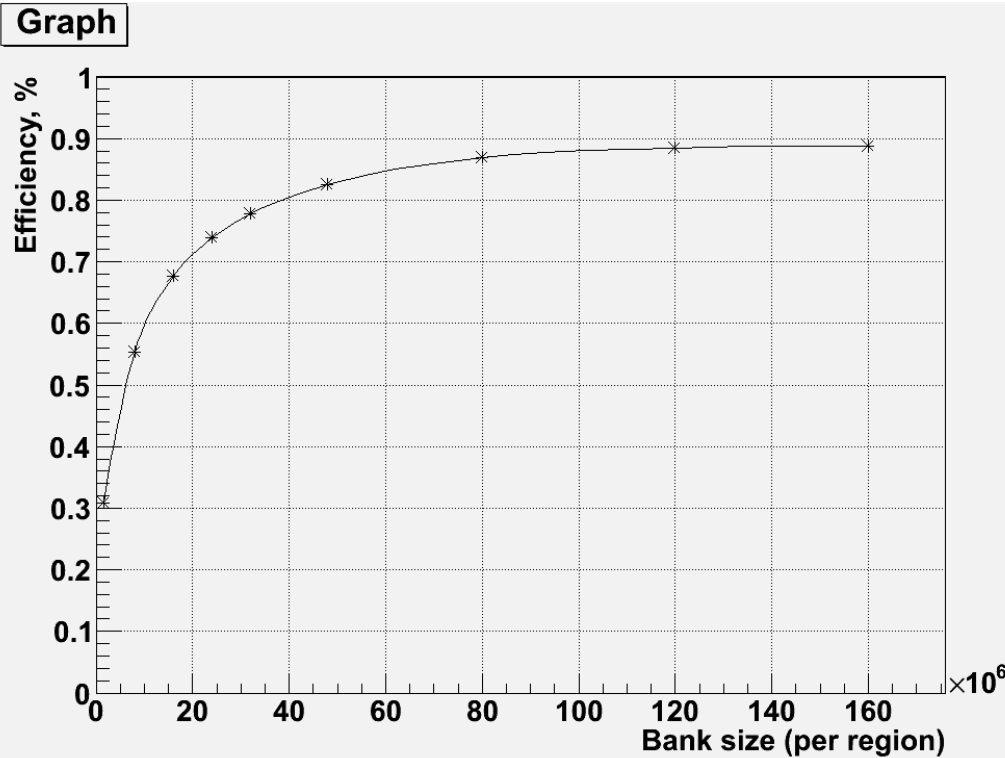
Good (bootstrapped) patterns-from-constants



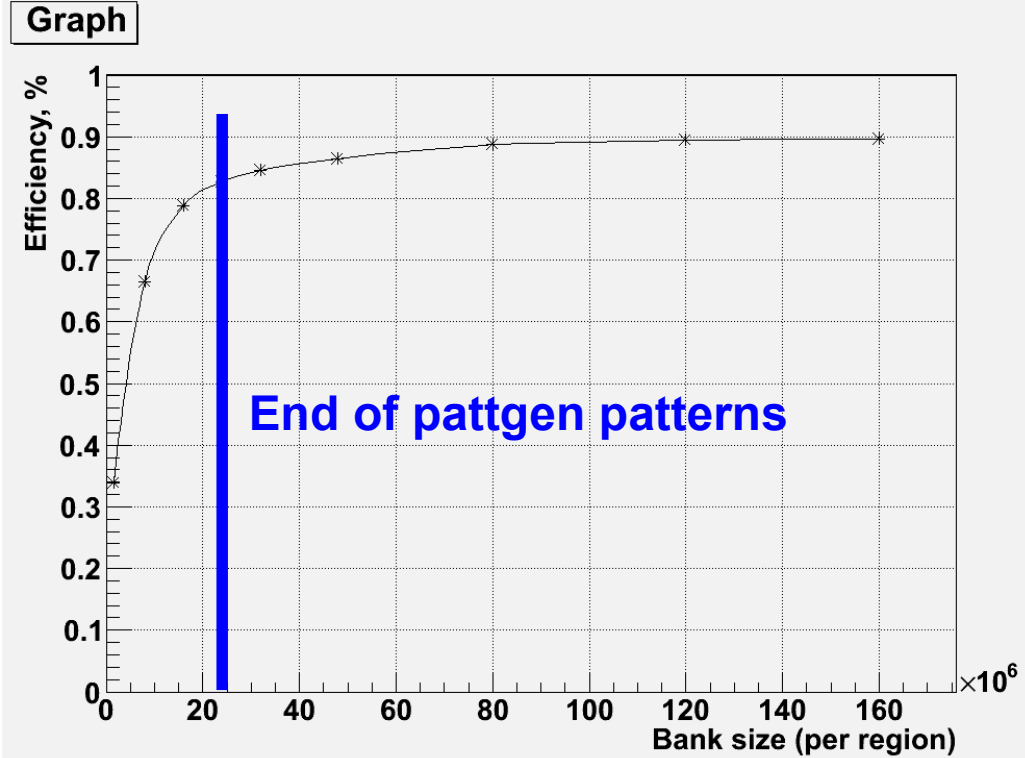
# 8L SS=16: benefits of pattgen

## Full-eta efficiency curves

Using patt-from-const only



Preload pattgen then fill up with patt-from-const



Far along the efficiency curve, there is little difference in pattgen versus patt-from-const. But early on, the slope is significantly better with pattgen patterns.

Since we want to operate in the ~30M patterns region (leaving the other ~30M for 4L stage), I think we can gain a few more percent by using additional pattgen patterns.

Overall, with all bugs fixed, having more single single muons is no longer critical for 8L architecture (but would be useful for others, such as 4L)

# Naoki's timing simulation

- Naoki came to CERN, so we met up for dinner
- Had a useful discussion of what his needs are
  - I went back to TrigFTKSim code and added all missing ingredients for Naoki's simulation into the roads ntuple
  - Updated plots.py script to print the following summary:

## **DATAFLOW INFORMATION:**

<b># of hits (entire detector):</b>	163863
<b># of clusters (entire detector):</b>	129187
<b># of clusters (only those routed to region 0), per plane:</b>	2906 2906 2973 2967 3068 3063 3079 3066
<b># of superstrips (within region 0), per plane (<i>NOT using min-overlap yet</i>)</b>	2359 2348 2440 2430 2541 2529 2556 2537
<b># of fit combinations per road:</b>	5.57
<b># of hits per superstrip in each plane:</b>	1.30 1.31 1.25 1.24 1.23 1.22 1.26 1.26

## **ROAD INFORMATION:**

<b># of roads out of AM:</b>	24683
<b># of roads out of RW:</b>	19440

## **TRACK INFORMATION:**

<b># of fits (total):</b>	122886
<b># of 11/11 fits:</b>	19765
<b># of 10/11 fits coming from 10/11 roads:</b>	86562
<b># of 10/11 fits coming from 11/11 roads (majority):</b>	16559