# Update on Realistic Silicon MC

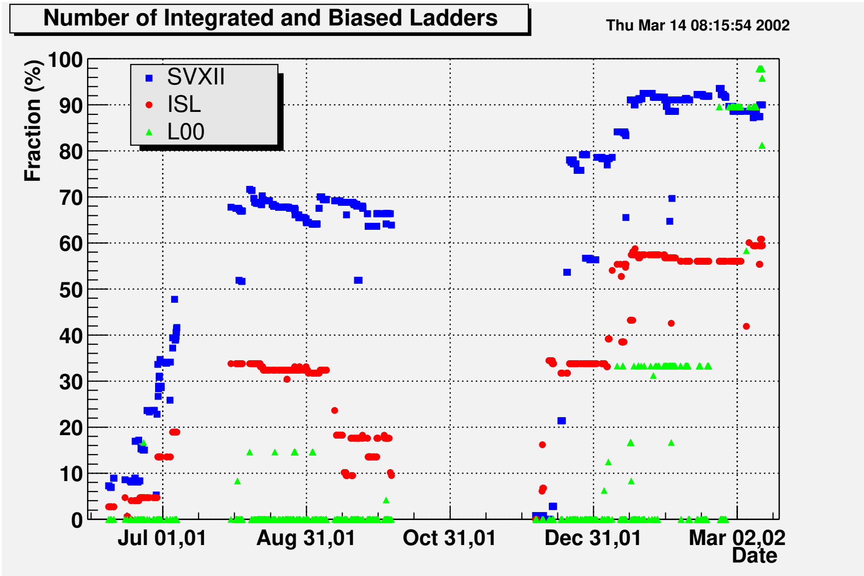
Aaron Dominguez
LBNL

Mar 22, 2002

- Justification
- Framework
- Charge deposition models
- Noise and Killing
- To-Do

People: Petar Maksimović, Sharon Jue, Satyajit Behari, Aaron Dominguez, Ben Mikesh, Igor Volobouev

# Justification




- Want to use MC for signal/background eff
  - Need vertex resolution to match data
  - Need b-tag efficiency to match data
  - Need fake rates to match data
- Silicon detector conditions changing as a function of time

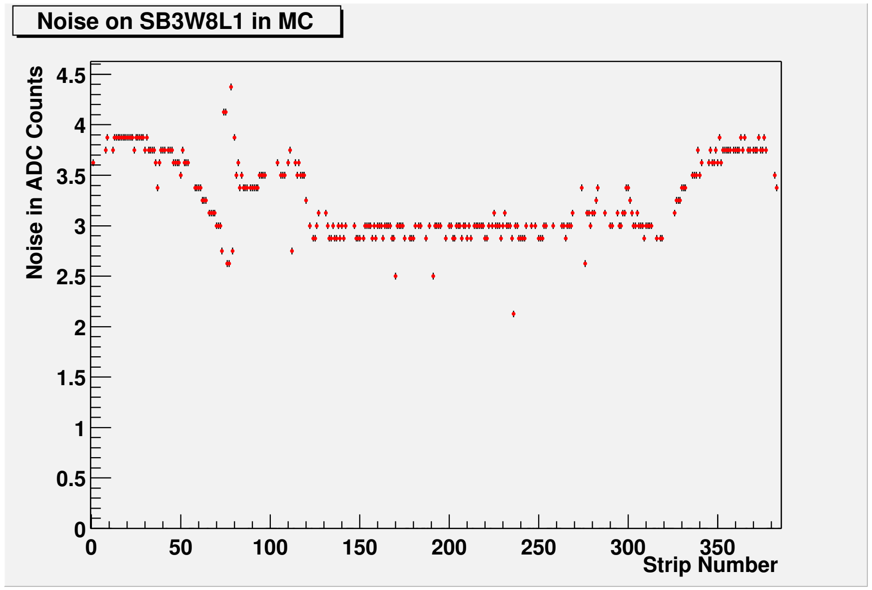
# Framework

- Almost all changing detector conditions in database
- Take advantage of this by mapping MC events to luminosity weighted runsections
- MC will know about this “new” run number and run section
  - Run numbers are the KEY to detector database entries
  - Run sections are the KEY to mapping rate of underlying/minbias events
- Generate ideal MC and change MC run and run section numbers at reconstruction time

## Realistic Silicon MC

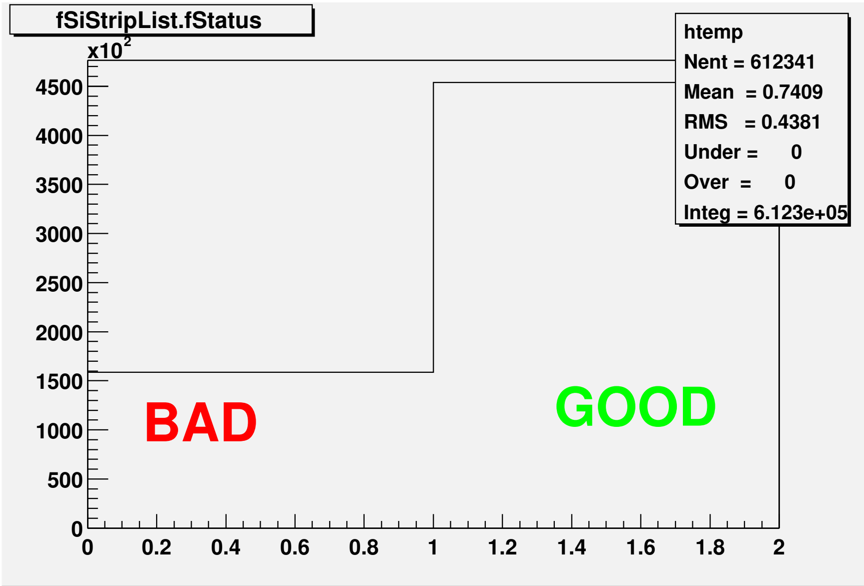
- Charge deposition model (Padova, Duke, UNM)
  - Should model single-strip landaus & and cluster profiles
  - Matching of intrinsic resolution and efficiency are goals
  - Use output of Si Studies Group
- Noise
  - Smears real hits
  - Causes fake hits
- Dead regions – inefficiencies
  - Bad strips
  - Ladders which aren't turned on
  - (Ladders which aren't biased but included)
  - Readout errors, data corruption
- Misalignments
  - Causes inefficiencies
  - Smears resolution
  - Causes fake b-tags
- Gain variations?

# Noise



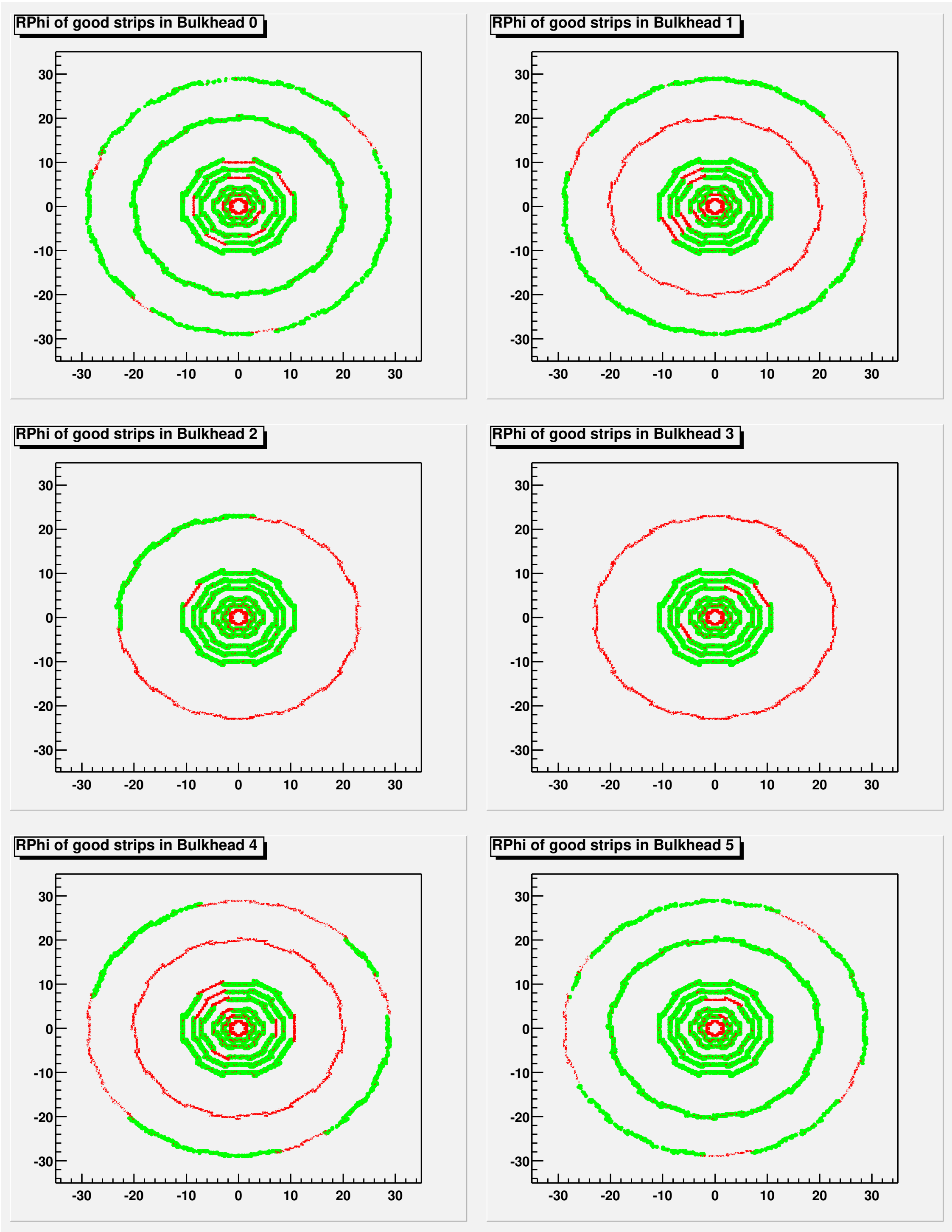

- Noise uneven across halfladder
- Generate fake hits above $2\sigma$ with gaussian of width 3 and reweight charge in reconstruction based on measured noise for that run
- Either smear physics charge at sim and save delta with gen charge, or don't smear at sim, but at reconstruction

# Bad & Dead Strips in Run 139900

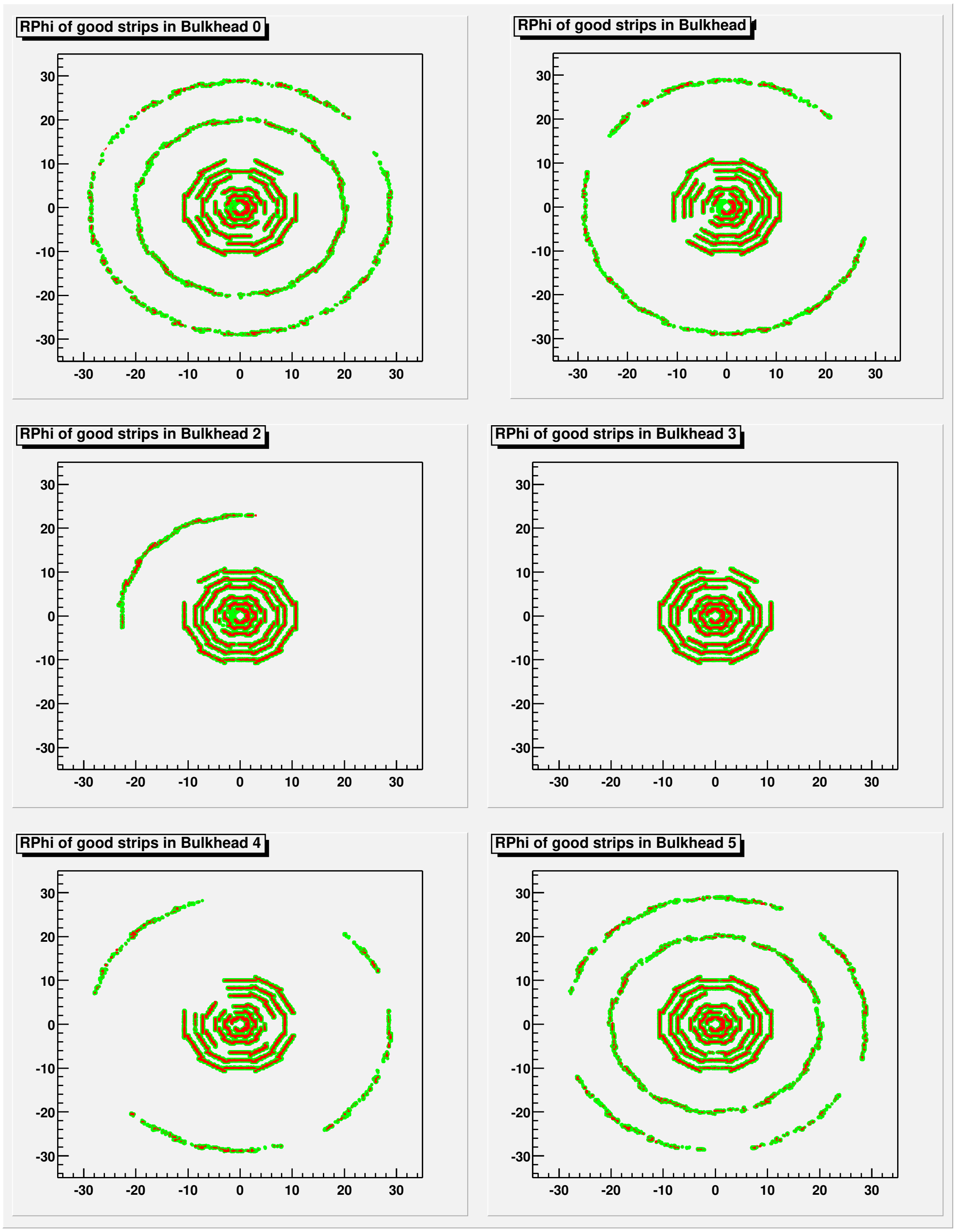



- Changed MC run to 139900 and ran reconstruction
- Read bad strip database according to UsedSet for this run
- Read hardware database for nonintegrated ladders for this run

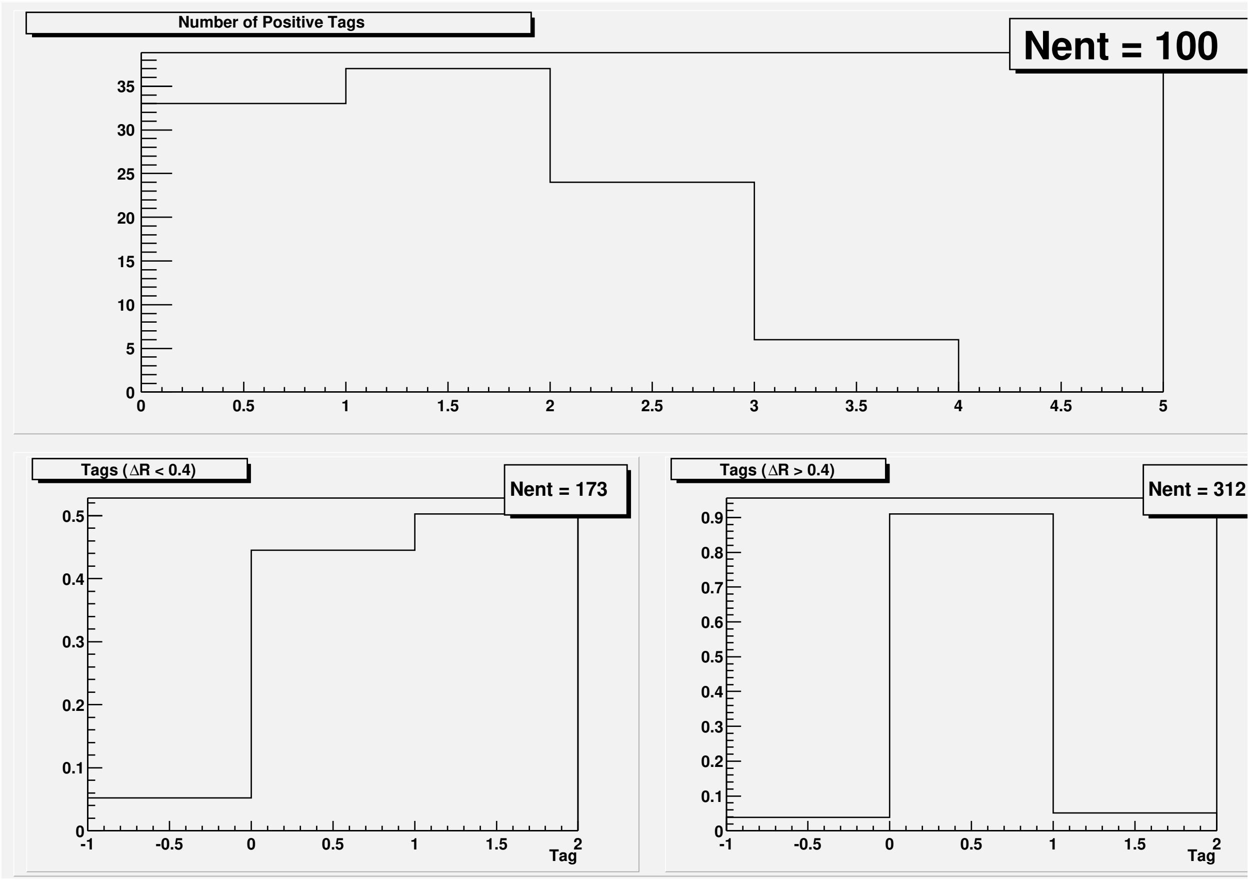
# Bad & Dead Strips in MC Run 139900



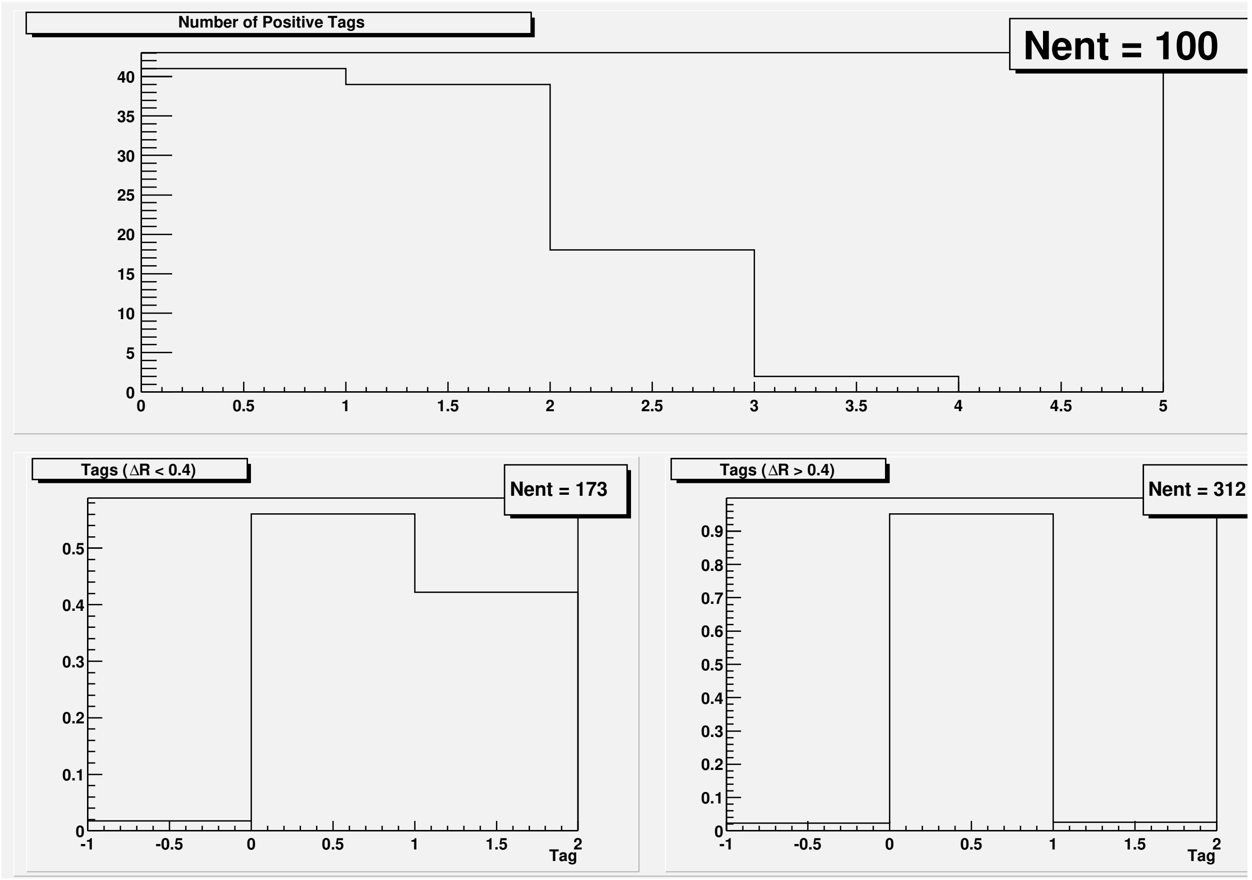
# Bad & Dead Strips in DATA Run 139900



# SECVTX B-tag Eff With No Killing



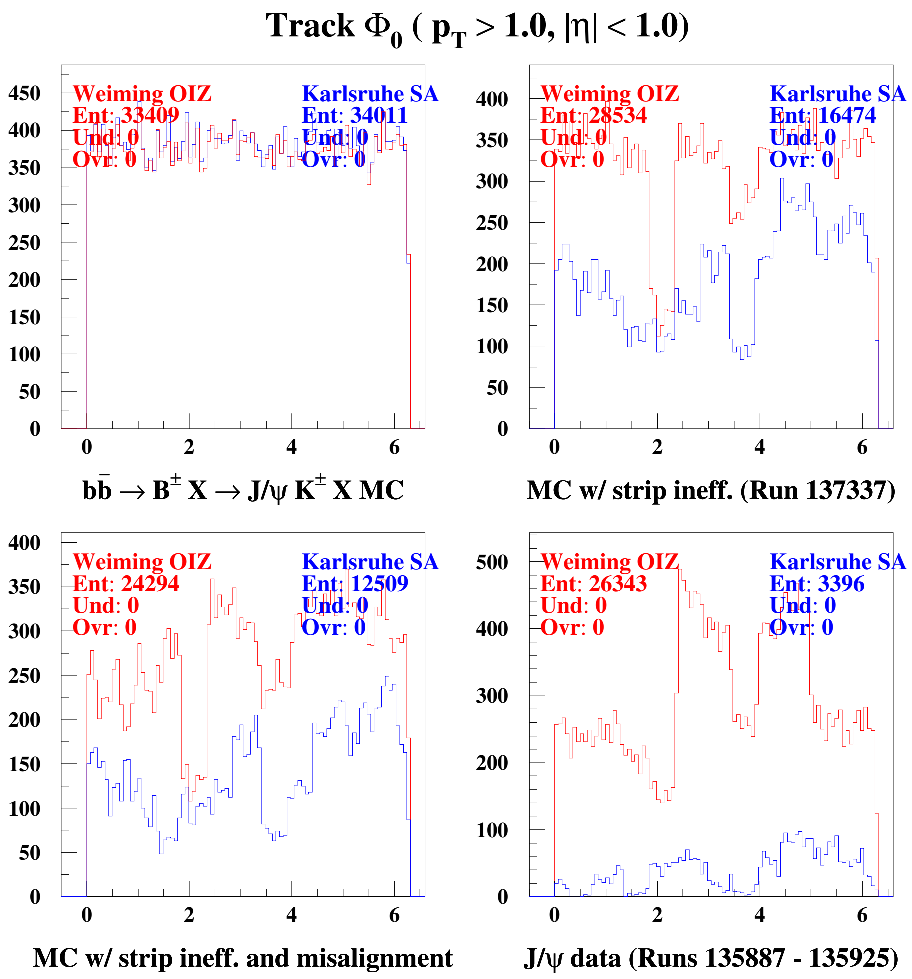
# SECVTX B-tag Eff With Killing



## Misalignment

- Nominal positions of detector elements are hardcoded. Same for MC and data
- Alignment tables in database are deltas wrt to these
- Very easy in MC to read a database table with these deltas
- For systematics studies, could run several jobs with different tables

# Satyajit's Look at Misalign and Not-So-Good Bad Channels



# To-Do

- Christoph's pearl script which takes as input $N_{\mathrm{MC}}$ and time period, and spits out run and run section numbers
- Change to framework which will allow to cleanly change MC run and run section numbers at reconstruction time
- Small piece of code to reweight ADC of noise hits in Si
- Decide on how to smear generated hits and implement
- Currently not able to keep track of readout errors
- Charge deposition model...