Summer projects at PPE

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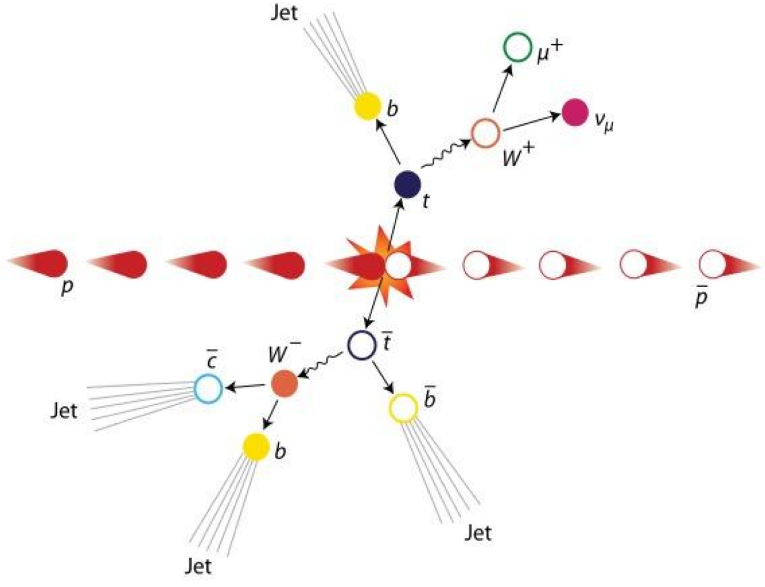


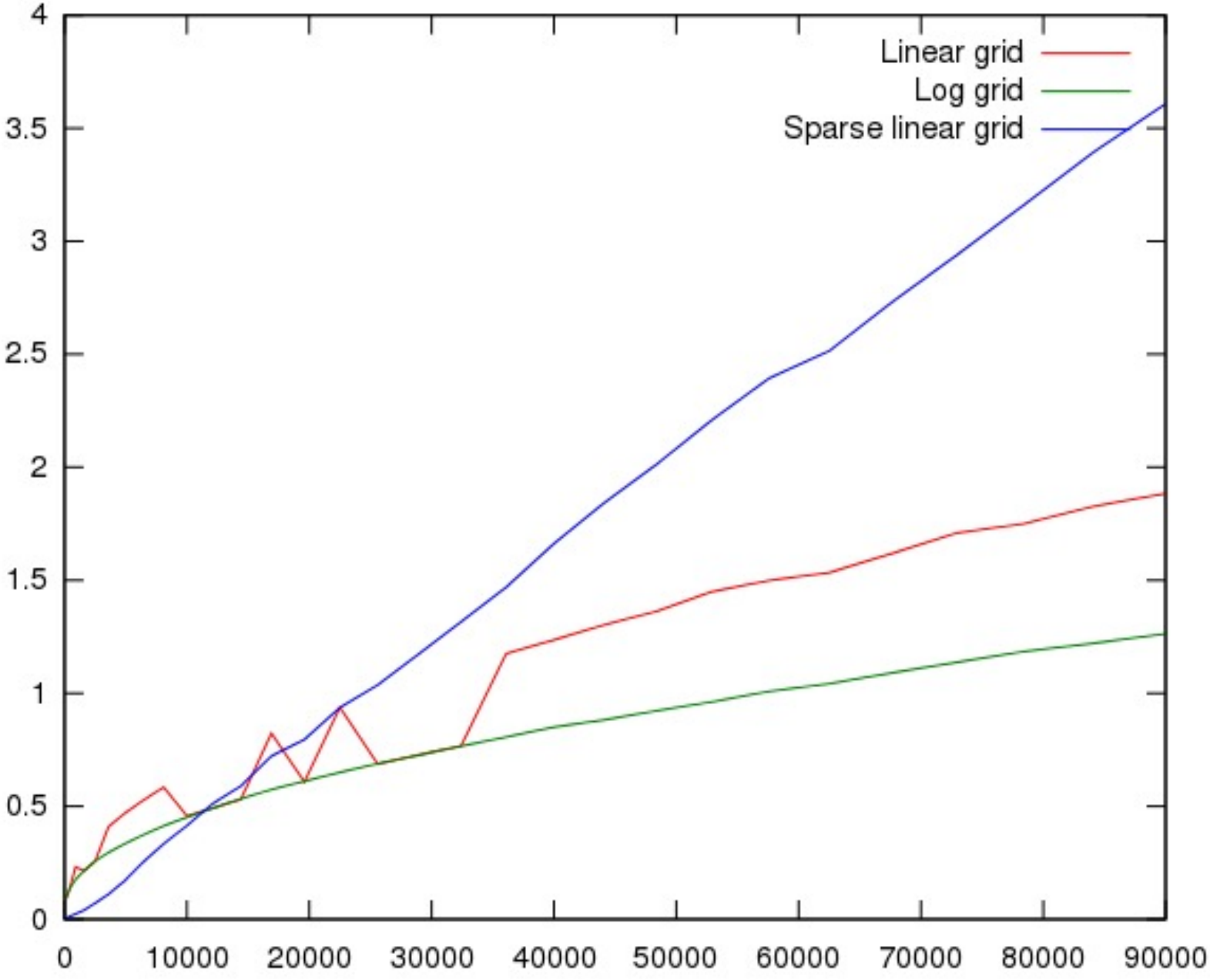
What is YODA?

YODA is a small set of data analysis (specifically histogramming) classes being developed by MCnet members as a lightweight common system for MC event generator validation analyses.

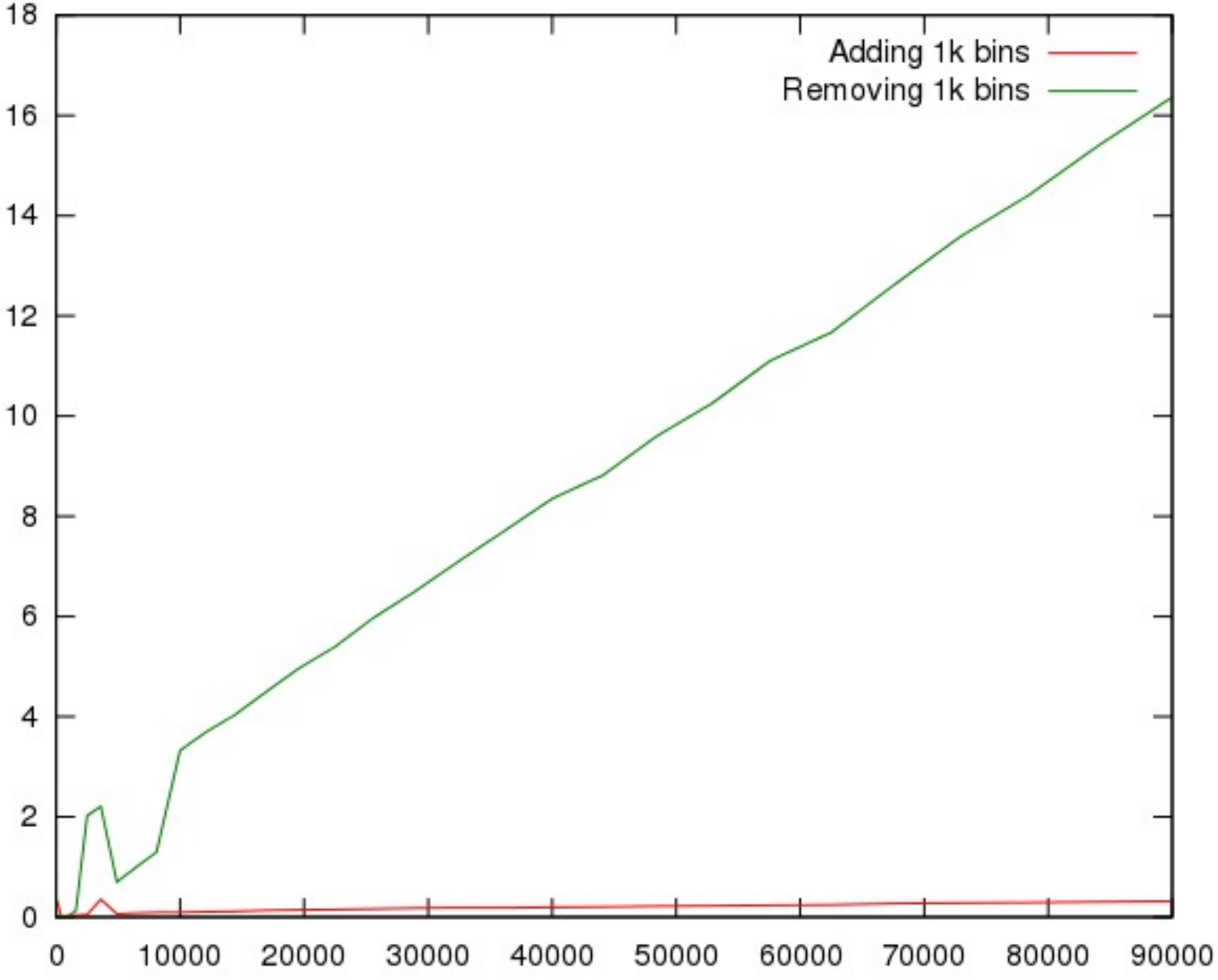
YODA capabilities

- Fully transparent and on-line bin management
- Efficient algorithms used under the hood
- Bin validation included
- Concise and modular codebase
- Python bindings
- Easily extendable with new classes

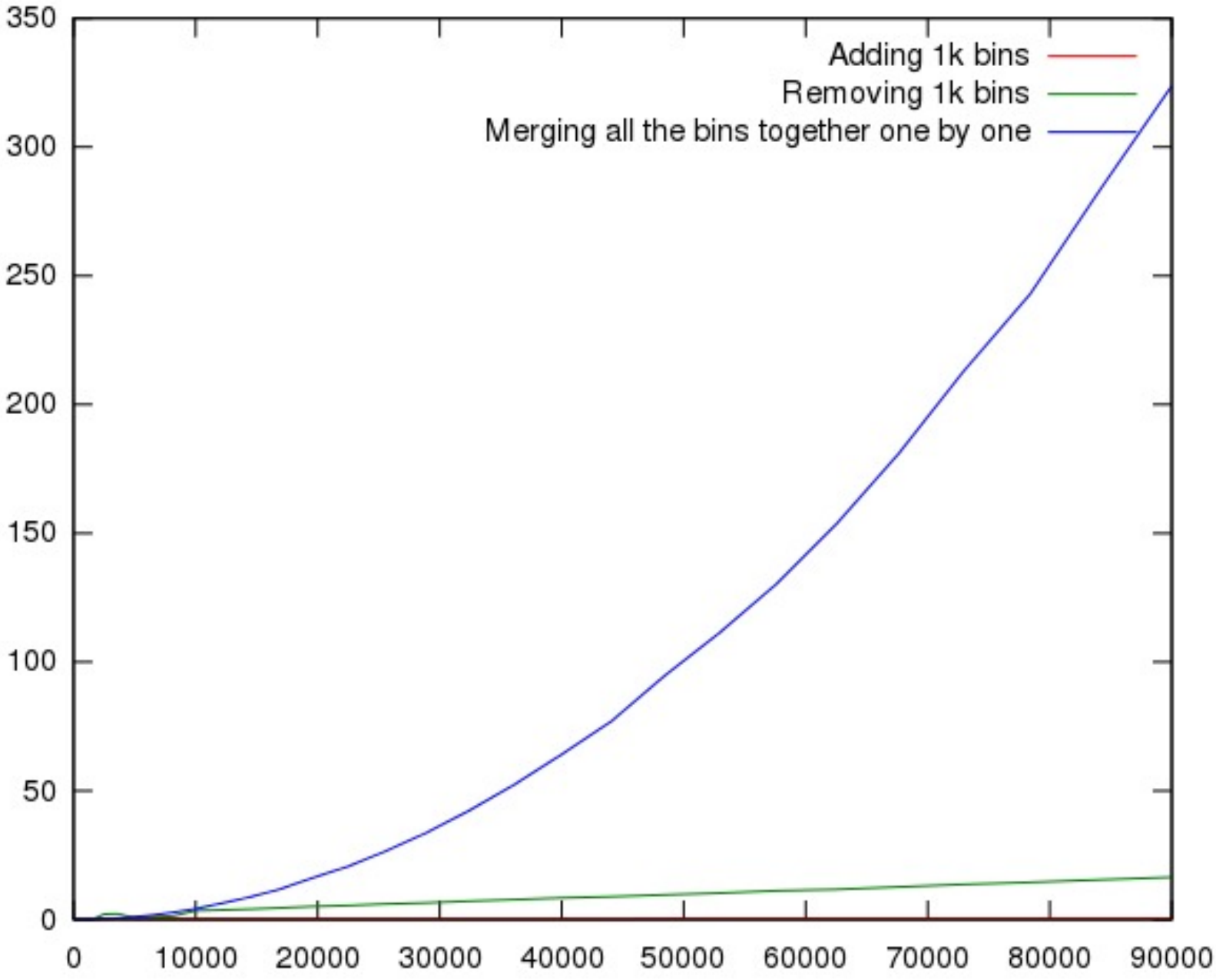
fill() operations



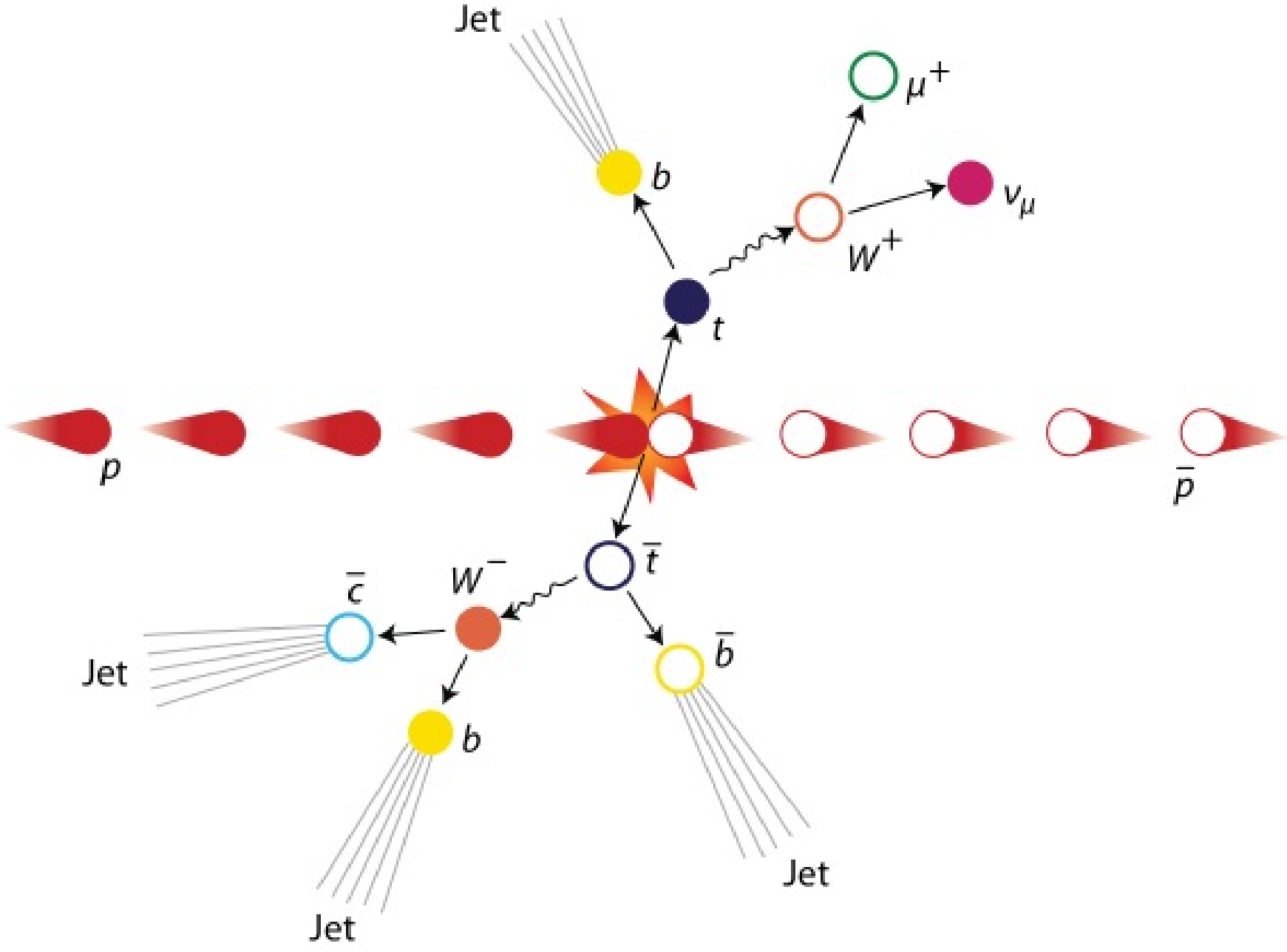
add/rem operations

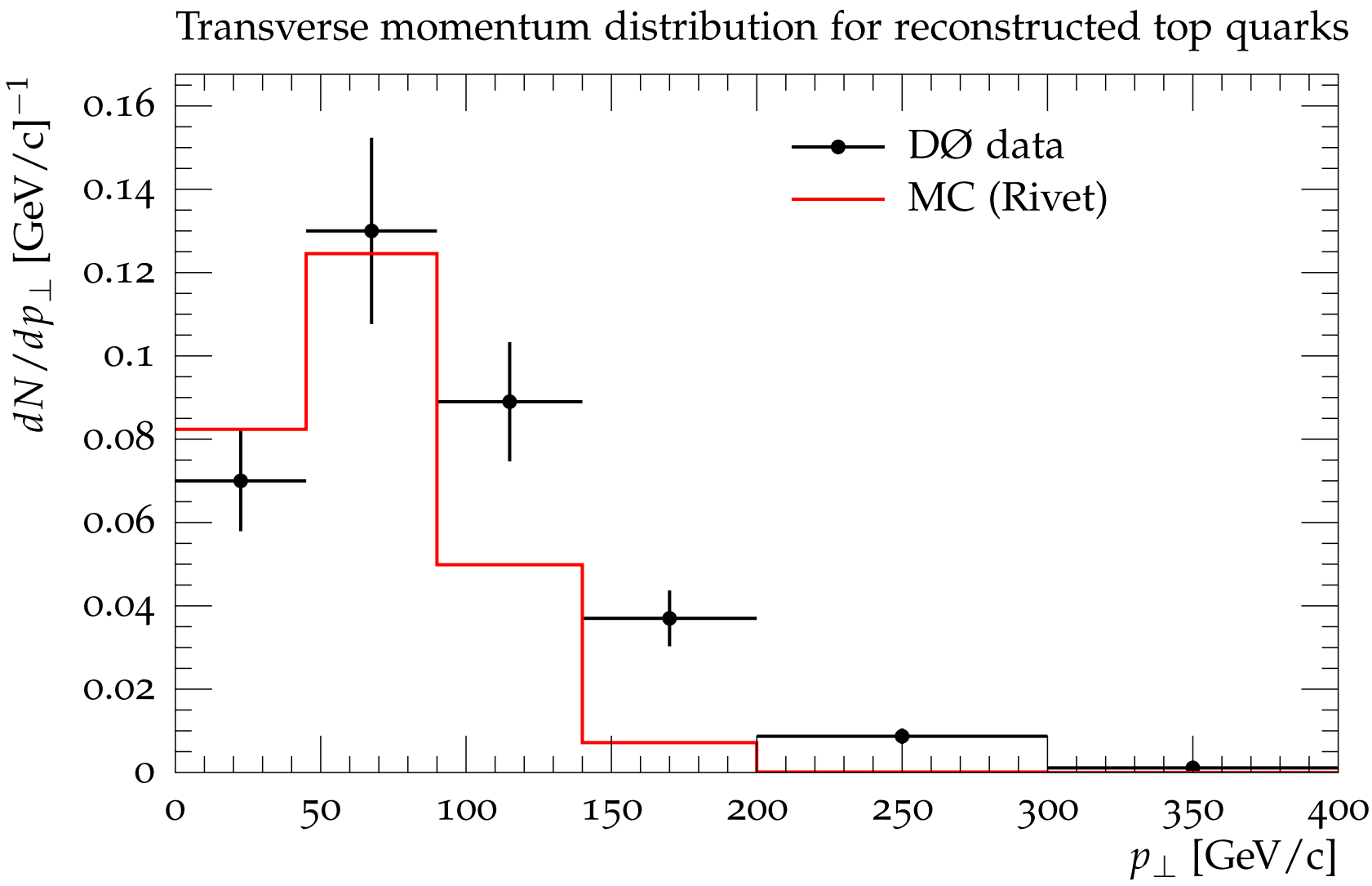


rebin() all bins



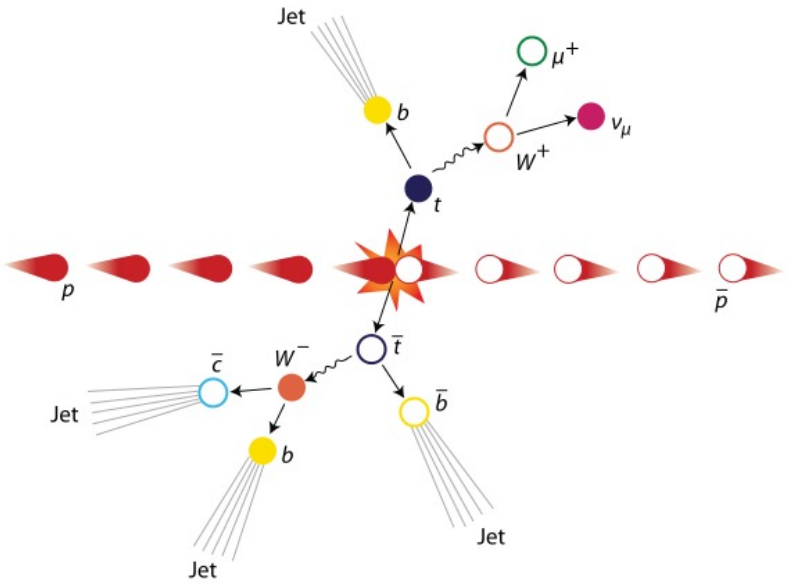
Top production route




Transverse momentum distribution for reconstructed top quarks
DØ data
MC (Rivet)
$dN/dp_\perp$ [GeV/c]$^{-1}$
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
50
100
150
200
250
300
350
400
$p_\perp$ [GeV/c]

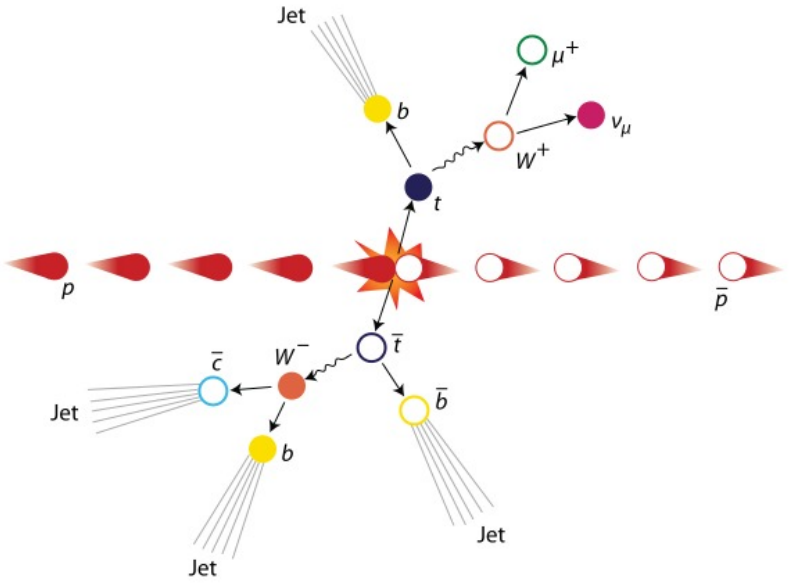
Top reconstruction - naive approach

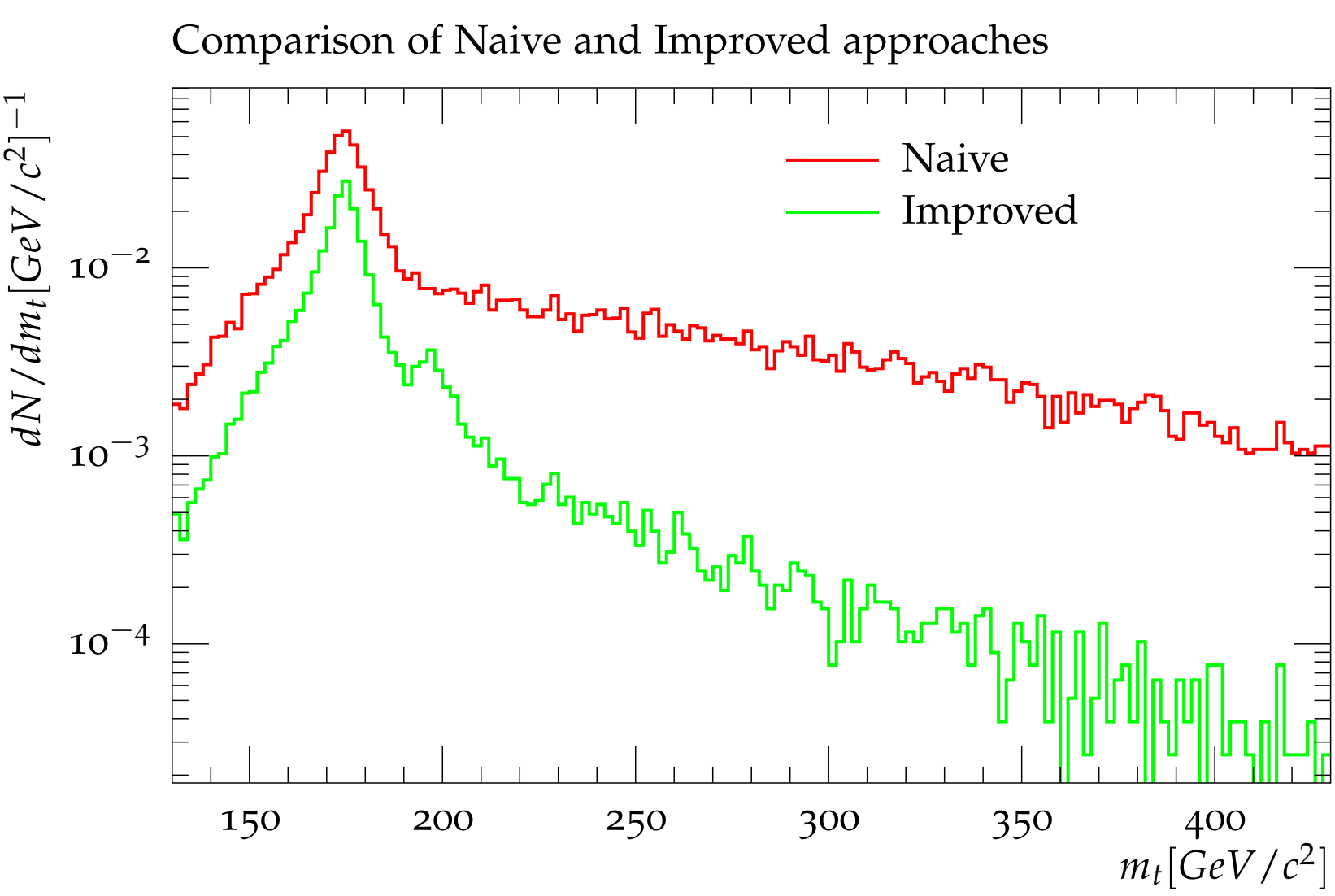
- One charged lepton
- Jet-finding algorithm
- Tag jets containing hadronised b-particles
- Reconstruct hadronically decaying W's mass from non b-tagged jets
- Place cuts on W mass (instead of weighting function)
- Reconstruct t, $\bar{t}$ pair



Top reconstruction - improvements

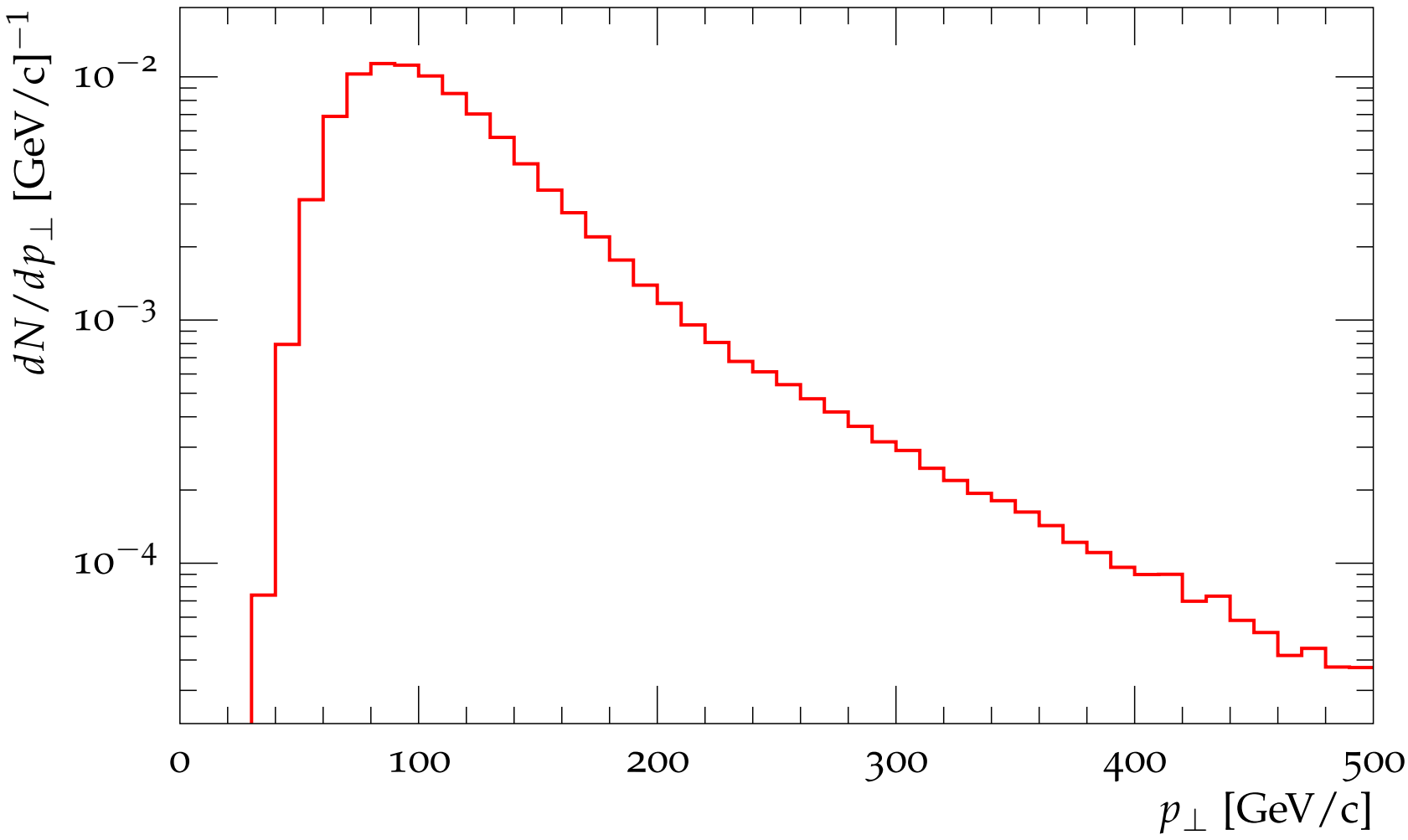
- Reconstruct leptonically decaying W as well
- Select combinations of l-jets that minimise difference in W-masses
- Choose t, tbar pair that minimises difference between t, tbar masses
- Change Pythia parameters!




Comparison of Naive and Improved approaches
Naive
Improved
$dN/dm_t[GeV/c^2]^{-1}$
10^{-2}
10^{-3}
10^{-4}
150
200
250
300
350
400
$m_t[GeV/c^2]$

Plotting

- Rivet uses make-plots
- Produces excellent plots
- Outgrown initial goals

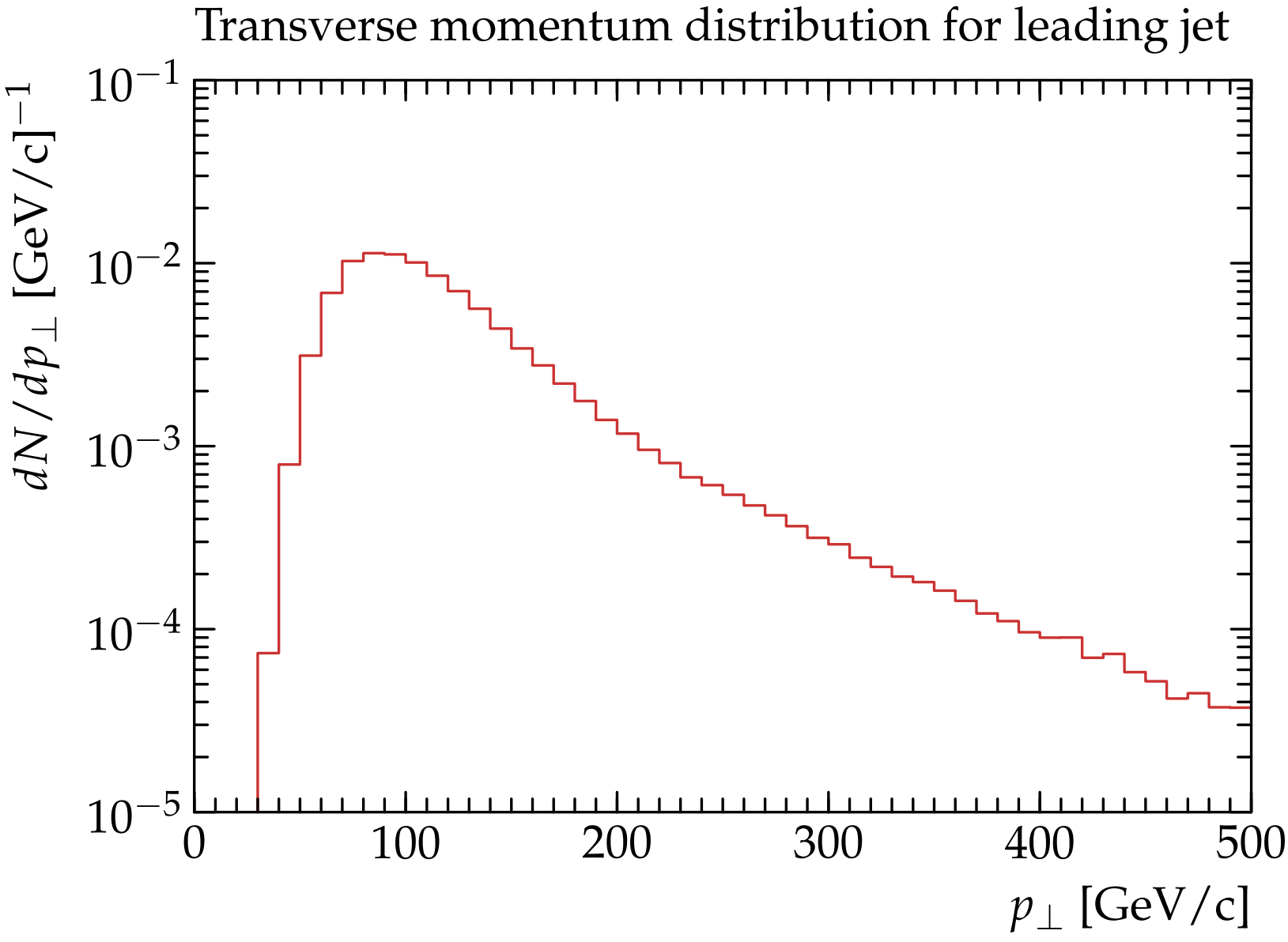

Transverse momentum distribution for leading jet
$dN/dp_\perp$ [GeV/c]$^{-1}$
10^{-2}
10^{-3}
10^{-4}
0
100
200
300
400
500
$p_\perp$ [GeV/c]

The ideal scientific plotting package

- LaTeX – use what you already use
- Preview – see changes as they happen
- Aimed at Physical Sciences
- Clear focus on graphics for print, not screen
- Simplicity over esoteric features
- Sane defaults

The not-so-ideal scientific plotting package

- A concise Python drawing library which uses TEX for text placement.
- Output as LATEX, PDF, PNG, SVG and on-screen preview
- Plotting library with heirarchical parameters
- First release *imminent*, along with thin wrapper for YODA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