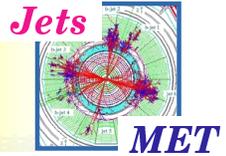




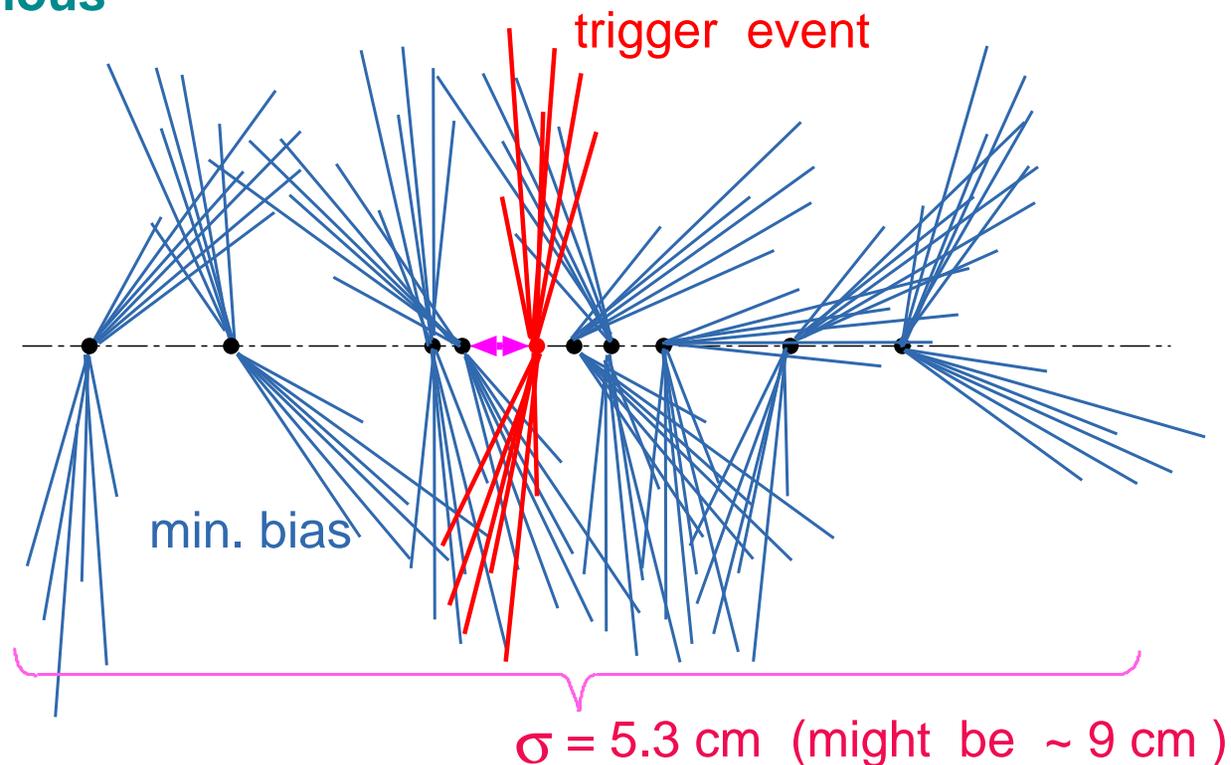
USING TRACKER TO REMOVE PILEUP JETS



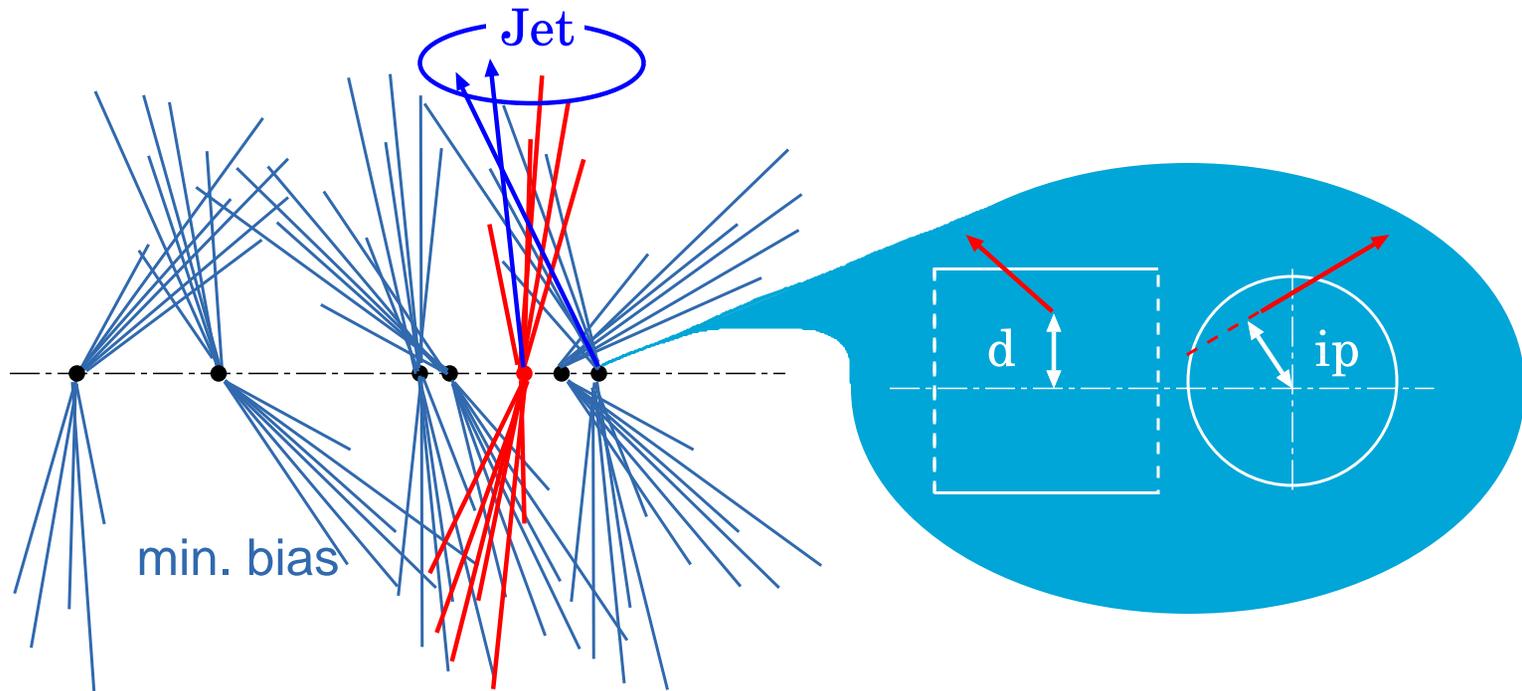
Salavat Abdullin, UMD

- Motivation
- Event reconstruction
- Used tools
- Some first results

- Quite obvious



- As the distribution of vertices is quite sparse compared to vertex z-coordinate measurement ($\sim 100 \mu\text{m}$), it's worth using the pp-vertex to suppress jets from pileup



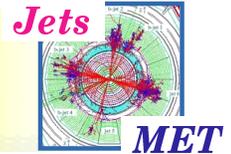
Step 1 : vertex finding (track clustering)

- selection of tracks with fairly small ip and vertex within pixels (d)
- vertex finding very similar to jetfinding (closeness $< 3\sigma$)
with possible merging of (close) vertices - works surprisingly well ...

Step 2 : jet tracks (according to calo impact point) linked to vertices



USED TOOLS



CMSJET home page



CMSJET package

Designed for **fast** simulation of the CMS detector response and subsequent event reconstruction.

First version was released in March 1993



You can click on a few transparencies below to get some additional info on the subject.



There is also a talk given at CMS Workshop on fast MC (April 10, 2001)




 **CMSJET 4.801**

<http://cmsdoc.cern.ch/~abdullin/cmsjet.html>

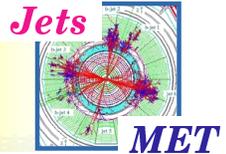
with
incorporated

 **FATSIM**

V.Drollinger et.al, CMS IN-2000/034



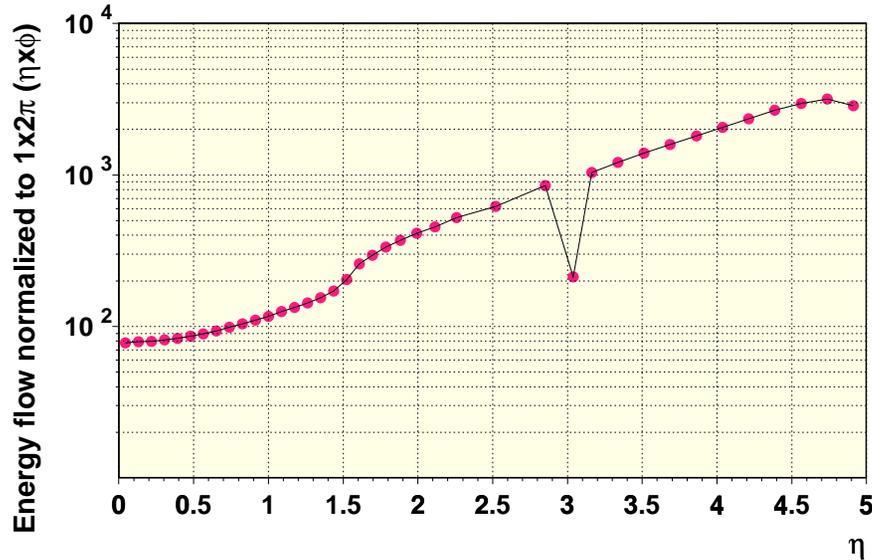
CHOICE (SELECTION)



 Once pattern recognition is performed
a chain of decisions follows ...
(some people call it "algorithm")

- Start from hardest jet ...
 - Find 2 hardest tracks in it ...
 - Belong to different vertices → jet hasn't a vertex
 - Belong to the same vertex → jet vertex found ...
 - Vertex linked to hardest jet (with vertex)
becomes **event vertex**
- Jets with vertex different from **event vertex** are rejected
(but those without vertex are kept ...)

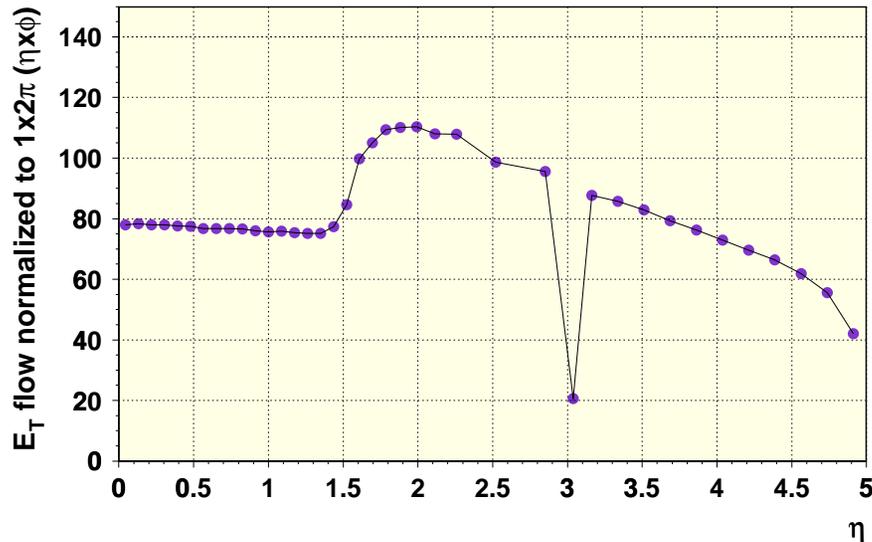
< 17.3 > min.bias events in CMSJET



How to compare jet rates at low/high lumi ?
(or even with generated jets)



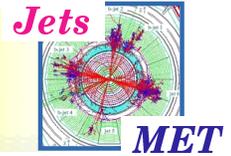
Subtracting the pileup "bias" from high-lumi jets ...



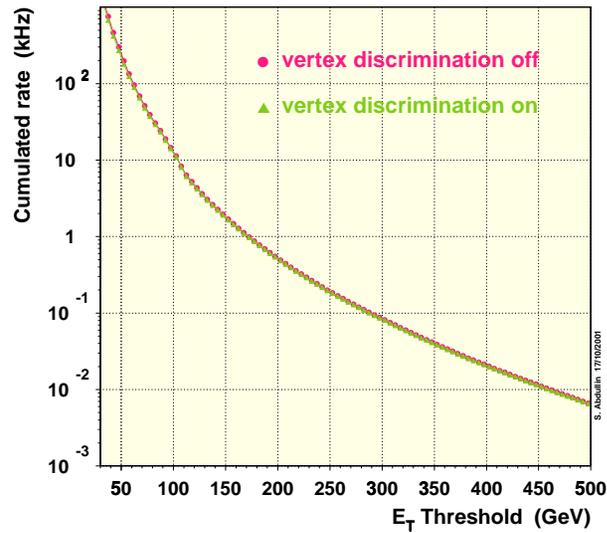
calculation of E_T flow in the jet cone according to available distribution (a kind of jet energy correction)



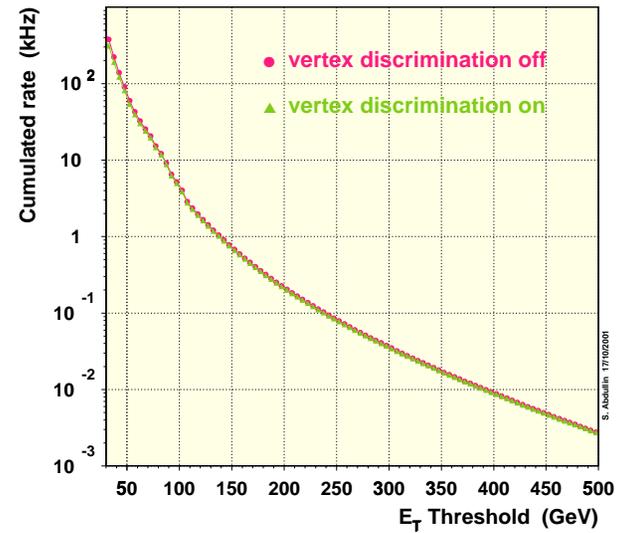
PRELIMINARY RESULTS ...



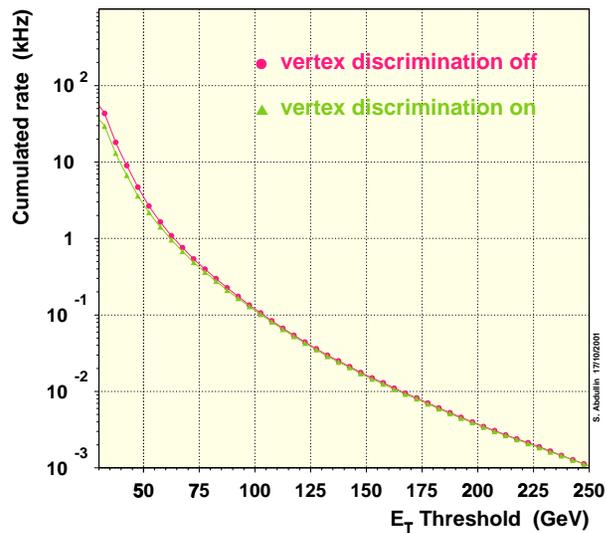
CMSJET Single Jet Rate at High Luminosity ($|\eta| < 5$)



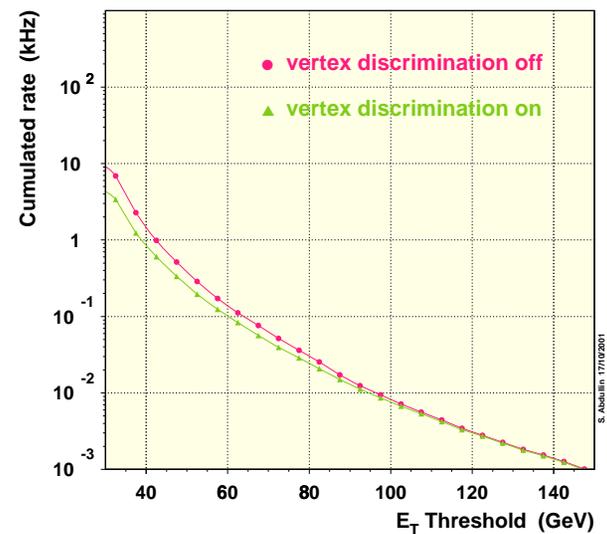
CMSJET Double Jet Rate at High Luminosity ($|\eta| < 5$)



CMSJET Triple Jet Rate at High Luminosity ($|\eta| < 5$)

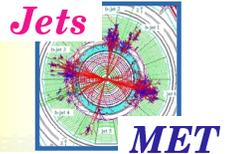


CMSJET Quad Jet Rate at High Luminosity ($|\eta| < 5$)





SOME FINAL COMMENTS ...



- Current PYTHIA-based simulation may overestimate the effect of the 3,4 (especially) jets rate suppression
 - "In reality" - much more real hard 3,4,5 ... jets than PYTHIA simulates
- B.T.W, the same is valid for multi-jet rates calculation ...
- The main question remains :
which jet to throw away and which one to keep if all of them (to some extent) have contribution from > 1 vertex ...

Criteria ?