

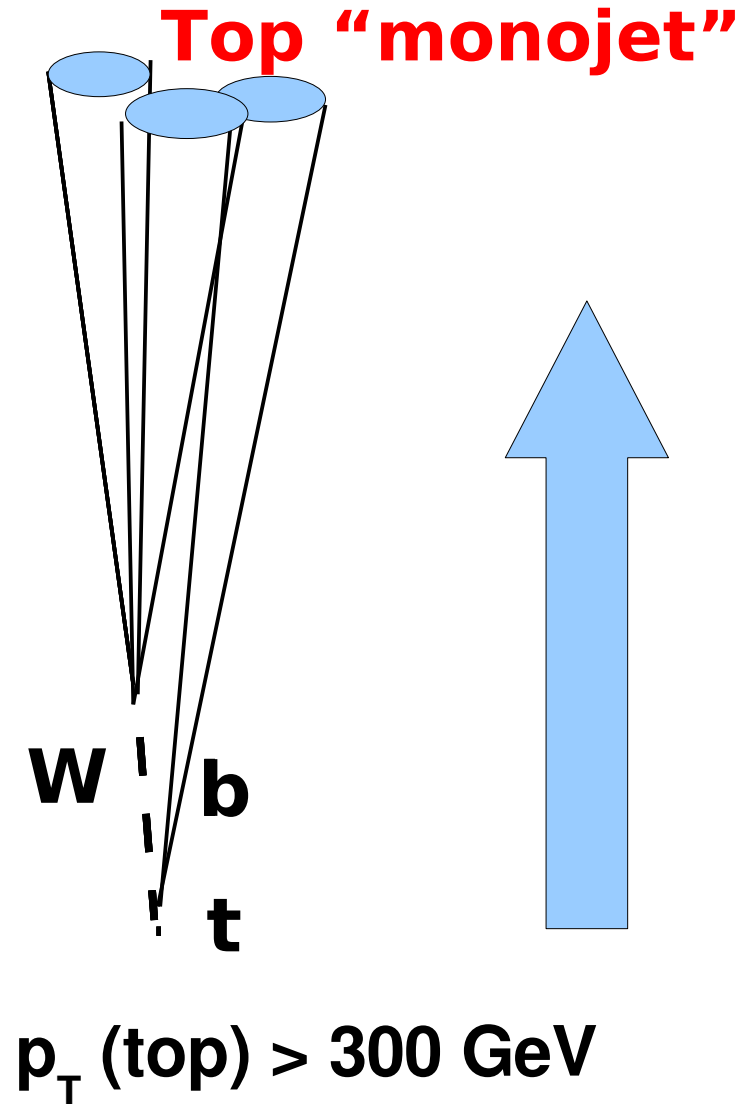
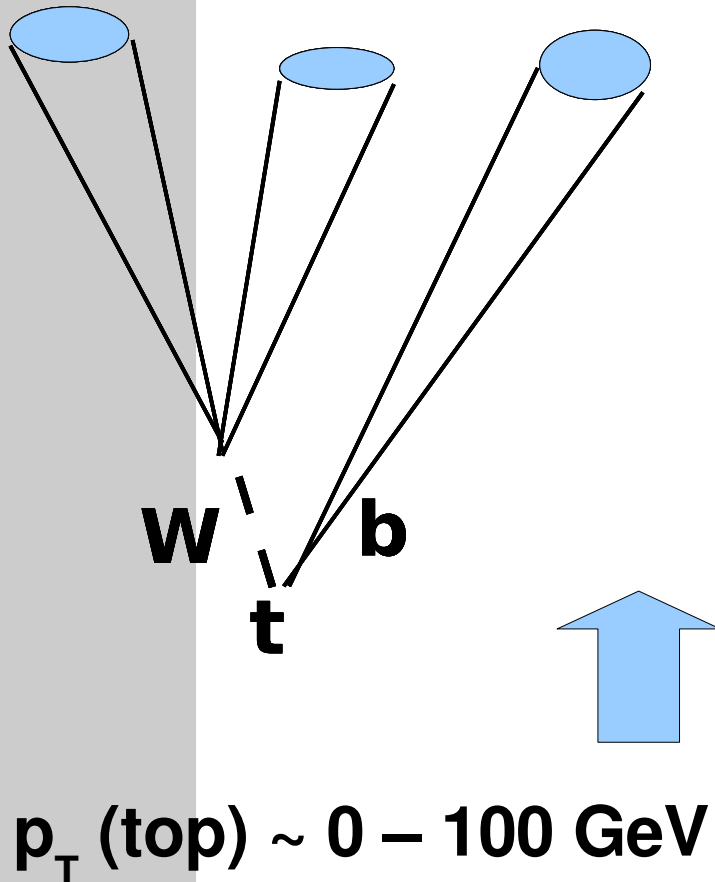


Top-tagging

Marcel Vos – IFIC Valencia

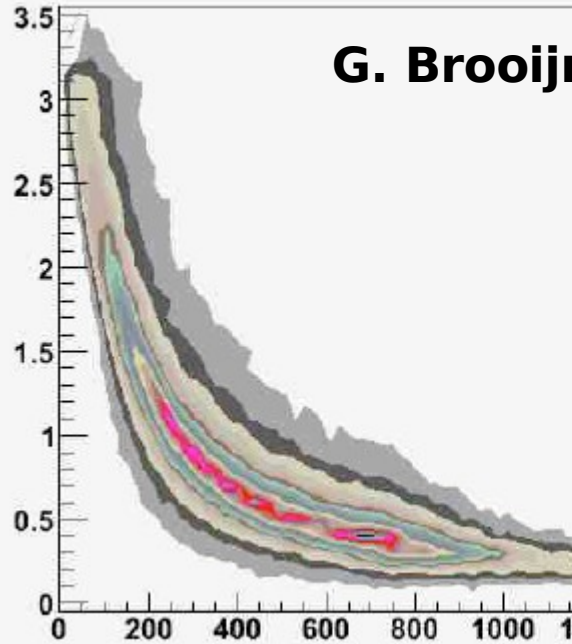


Reconstruction of hadronic top monojets



Reconstruction of top monojets

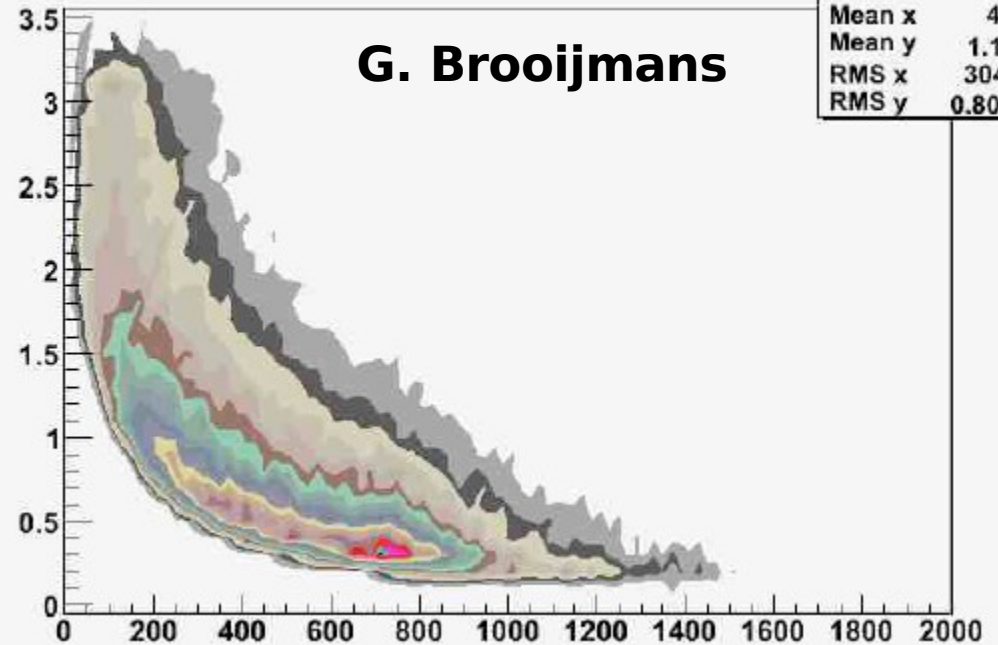
dR b-W vs top pT



G. Brooijmans

drbWvth	
Entries	208914
Mean x	469.4
Mean y	1.035
RMS x	303.9
RMS y	0.7763

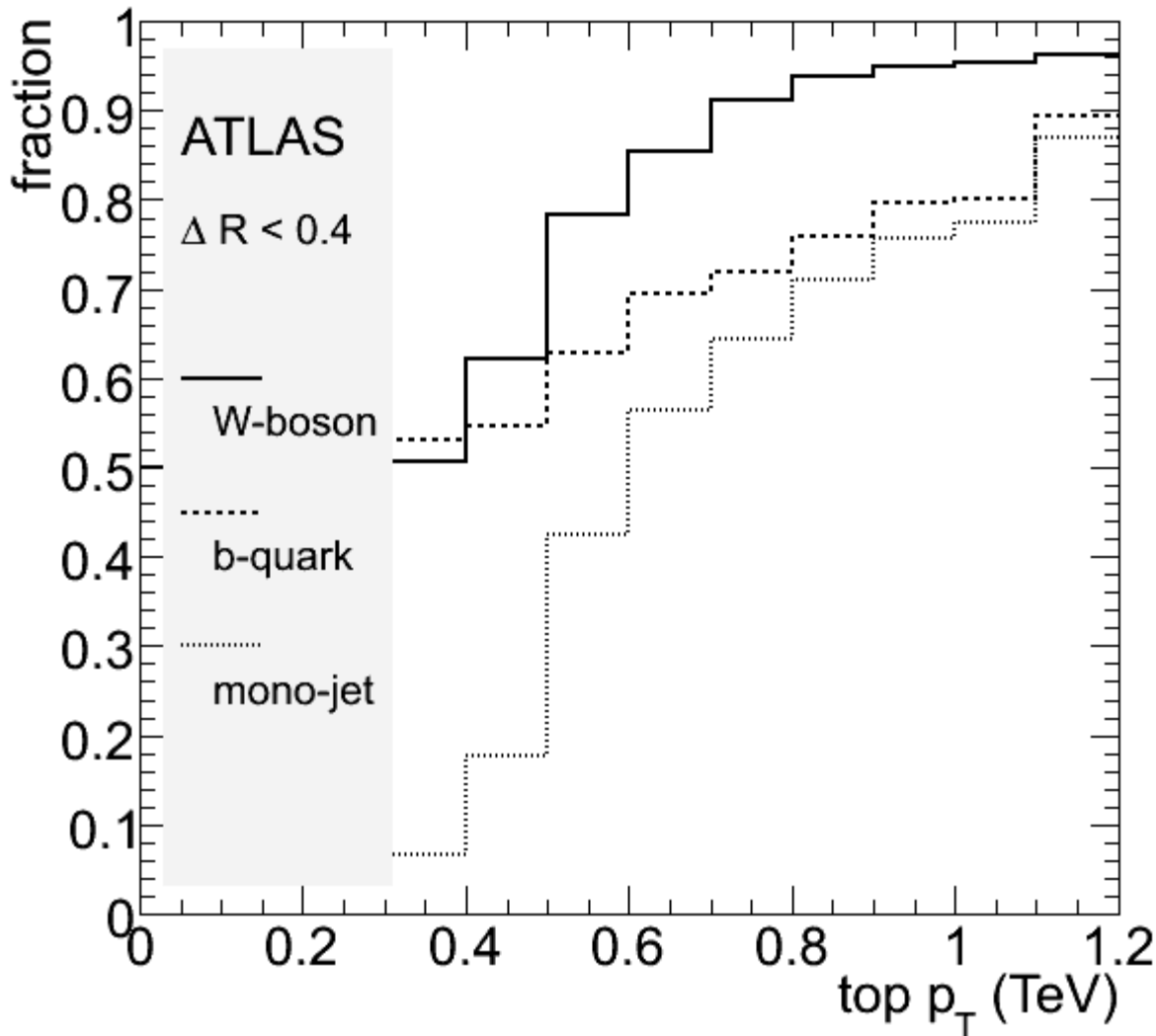
dR qq (from W) vs top pT



G. Brooijmans

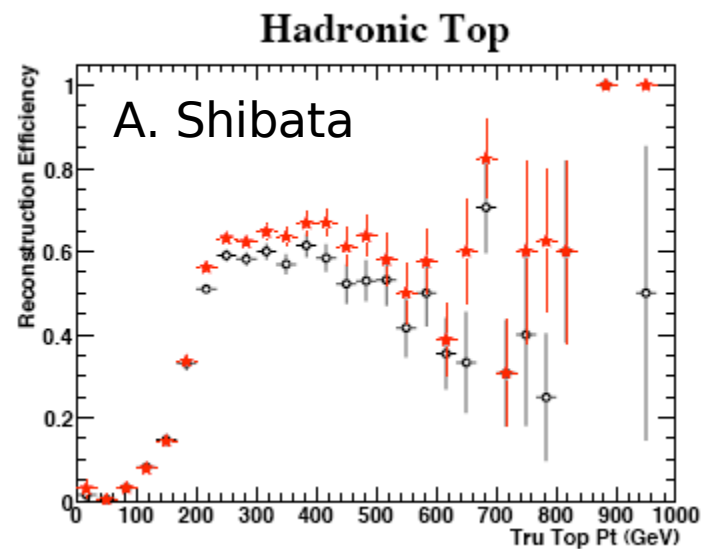
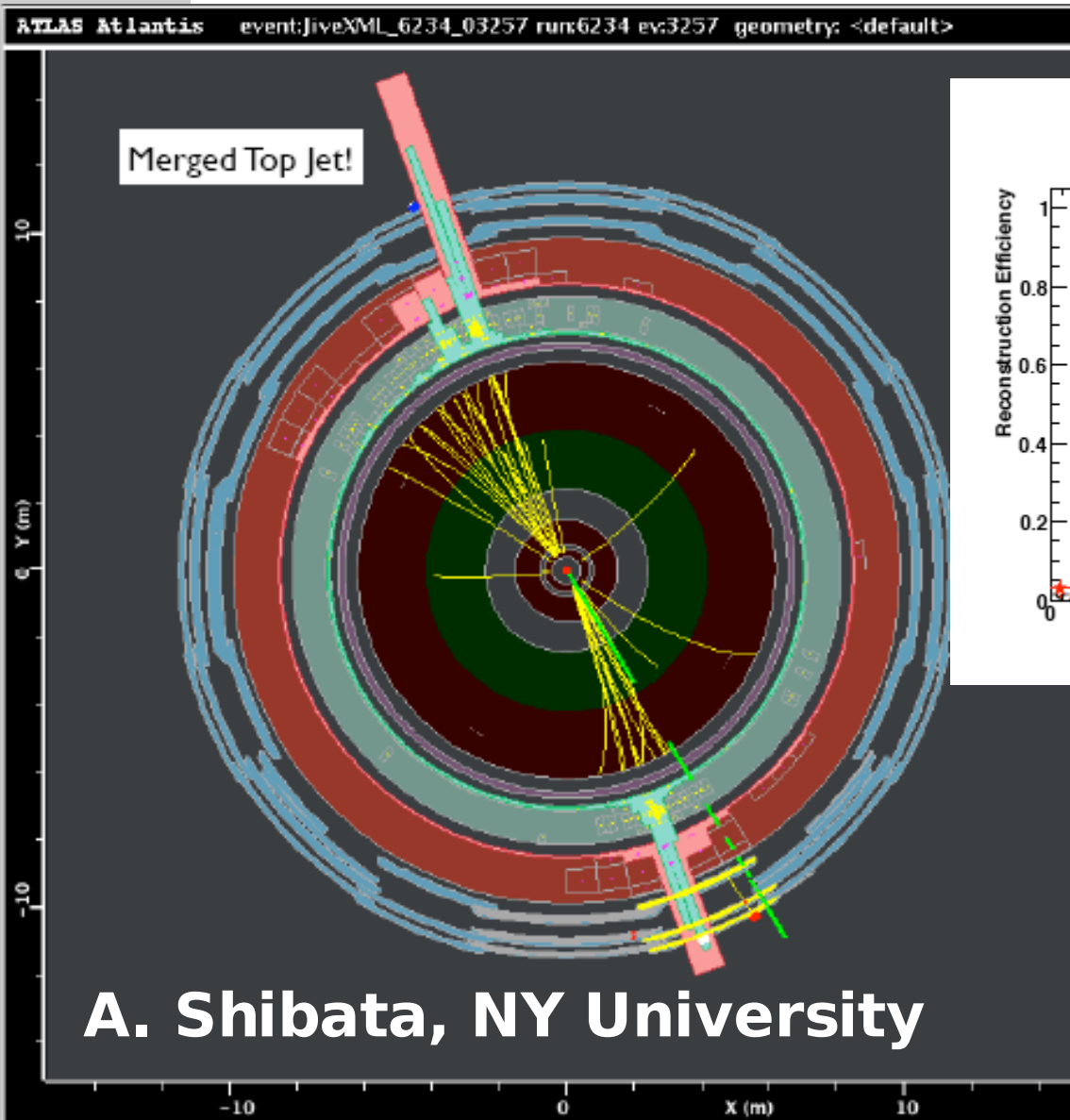
drqqvth	
Entries	104457
Mean x	470
Mean y	1.171
RMS x	304.5
RMS y	0.8075

Reconstruction of top monojets



Probability to find top decay products in a small cone around the reconstructed jets

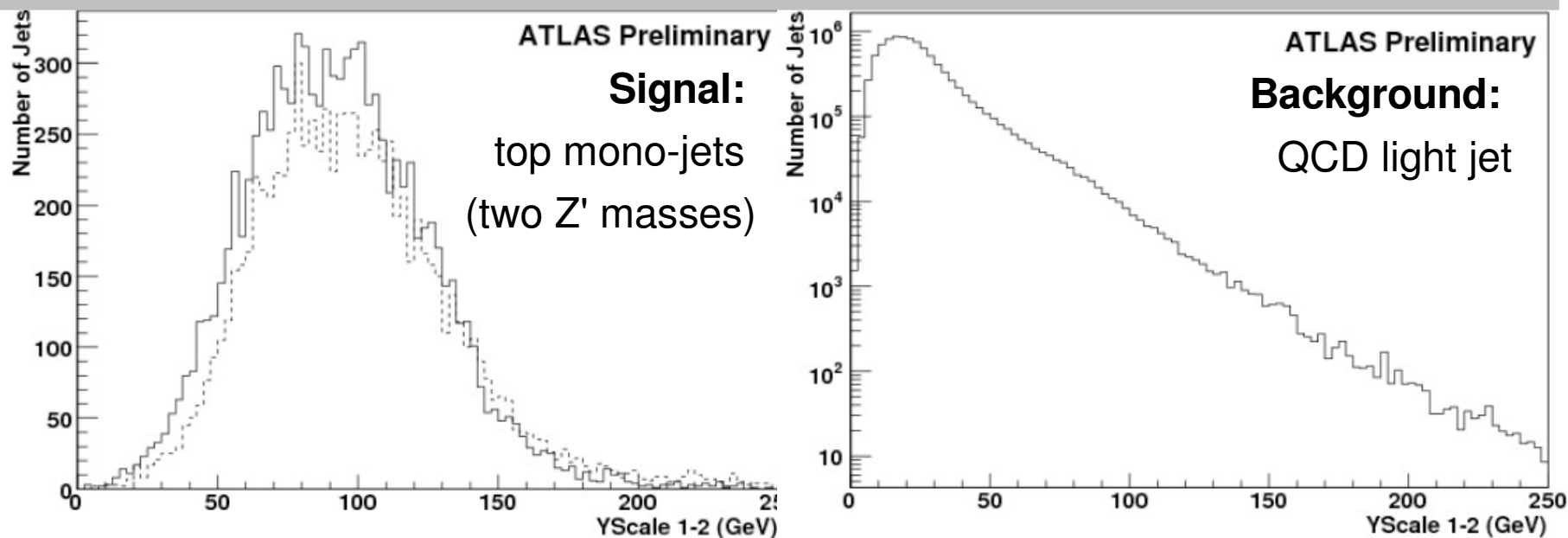
Reconstruction of top monojets



Standard resolved
“commissioning style”
top reconstruction.
Beyond 400 GeV
strongly reduced

● High p_T top: alternative approach

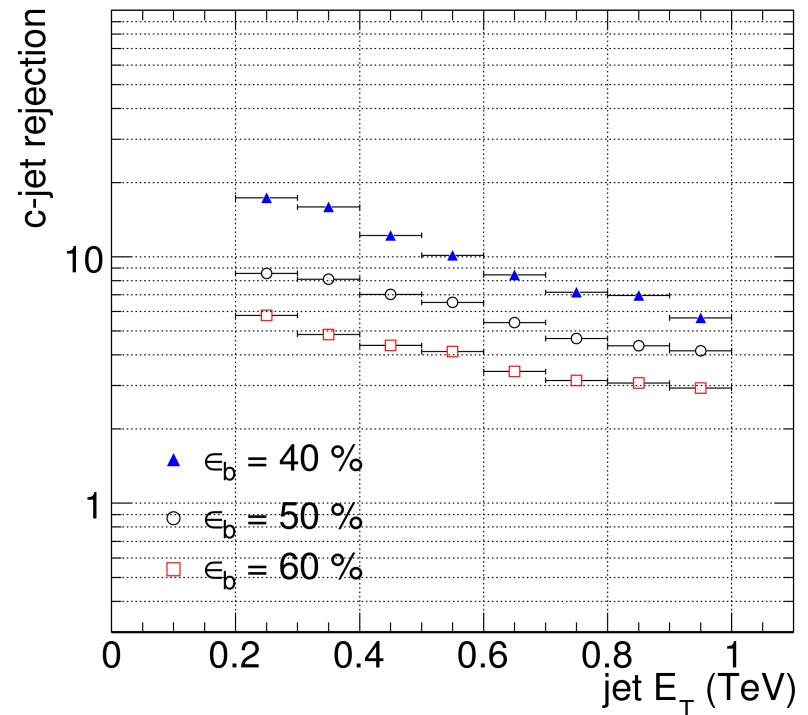
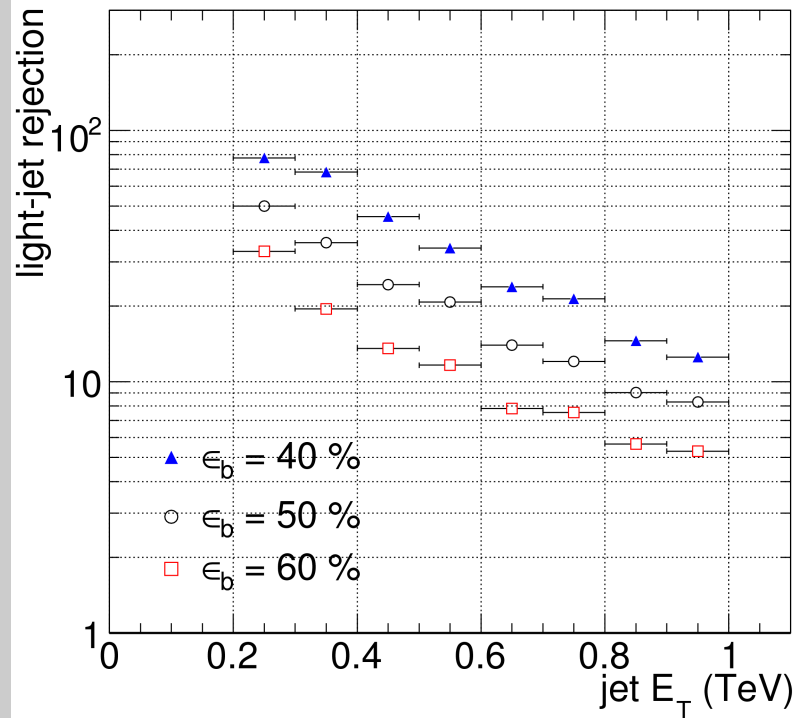
Distinguish top mono-jets from QCD (light) jet background using the jet structure



G. Brooijmans, High p_T Hadronic Top Quark Identification Part 1 : Jet Mass and Ysplitter, ATL-PHYS-CONF-2008-008; ATL-COM-PHYS-2008-001

M. Vos, High p_T Hadronic Top Quark Identification Part 2: life-time signature, work in progress

The lifetime signature

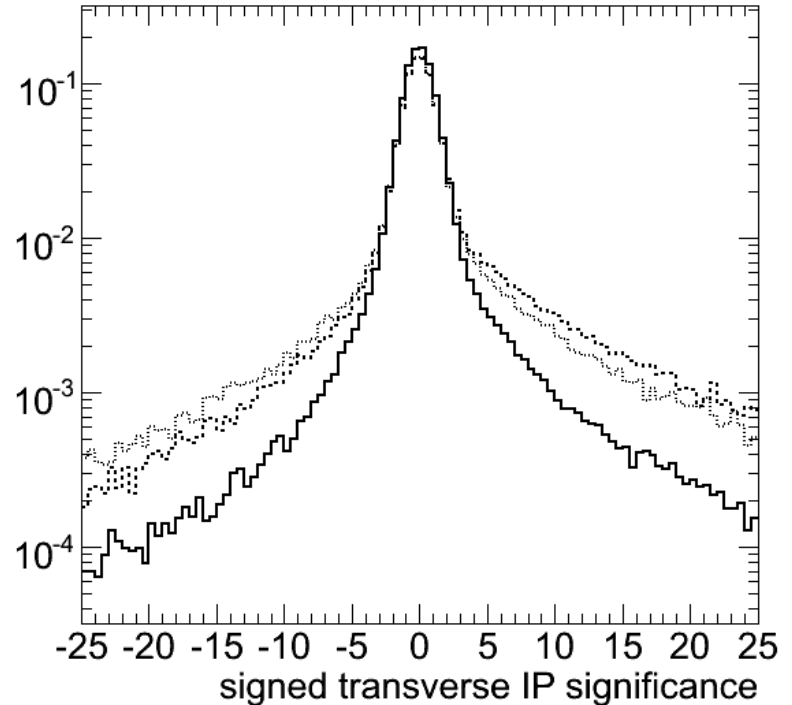
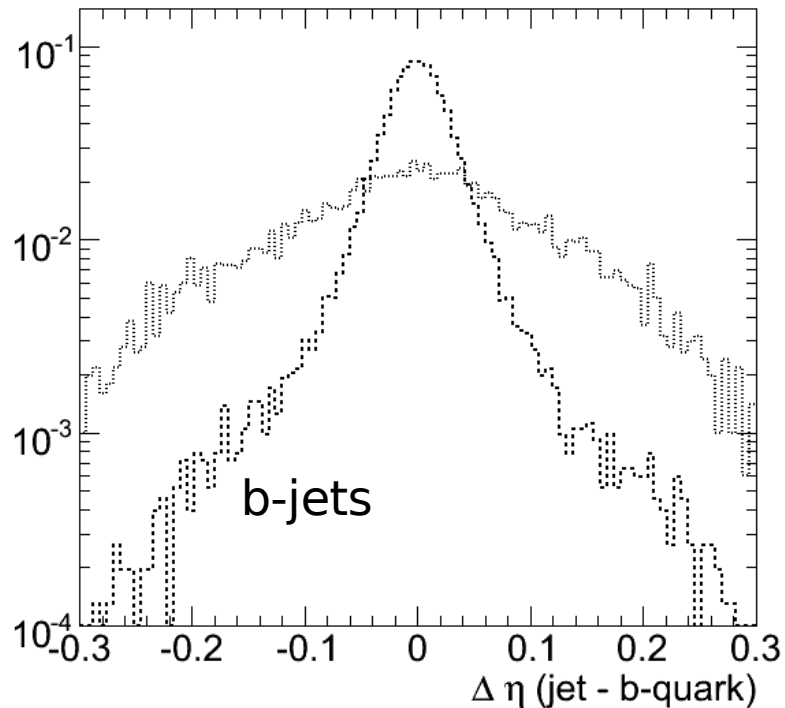


The figures show the b-tagging performance achieved with the SV1 + IP3D algorithm after a rigorous retuning of its parameters

A hadronic top monojet is a b-jet with some additional noise from the W-decay, but of course it is a very high p_T jet

● The lifetime signature

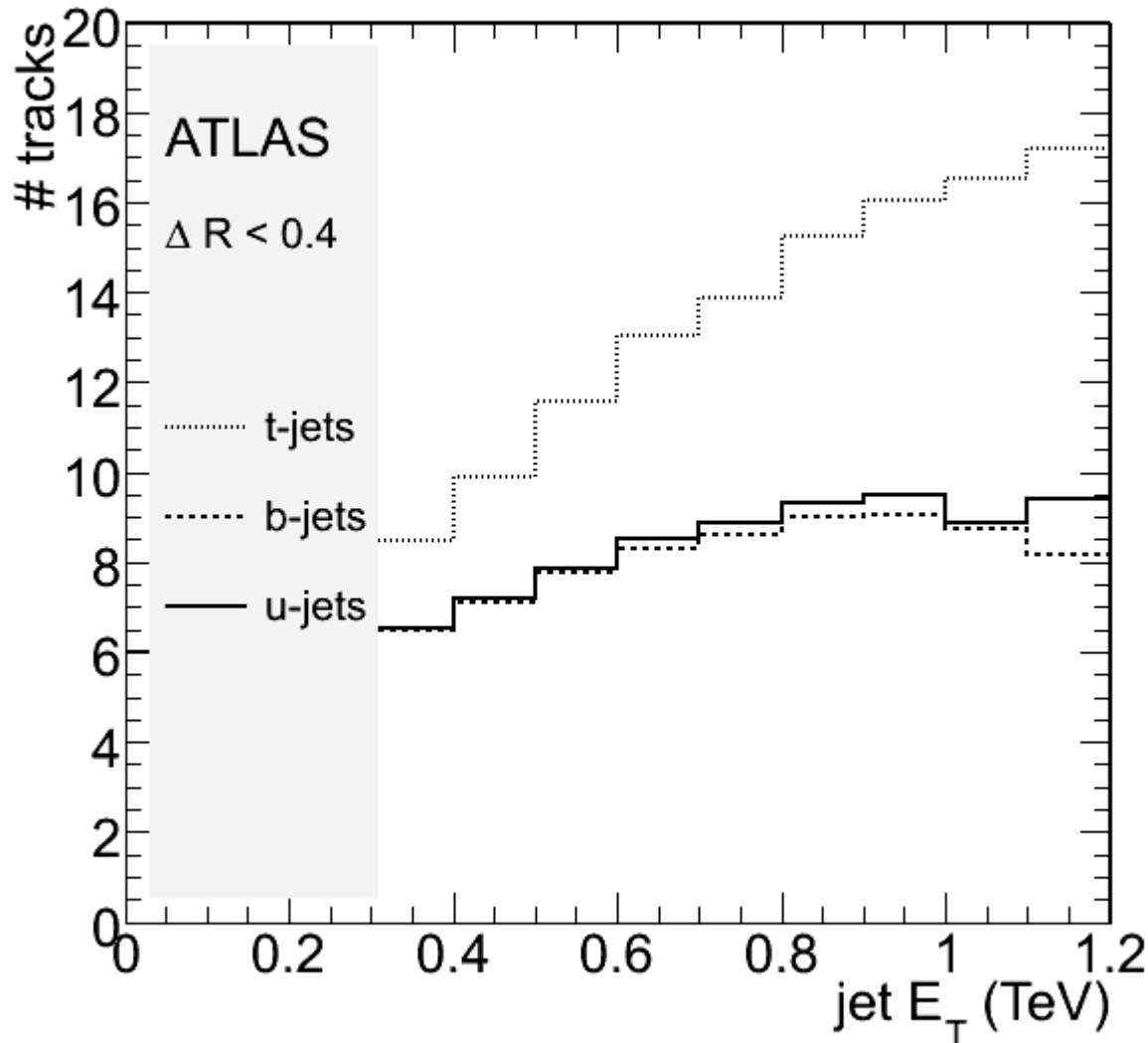
— — Hadronic top monojets · · · b-jets — light jets



The noise from the W-decay:

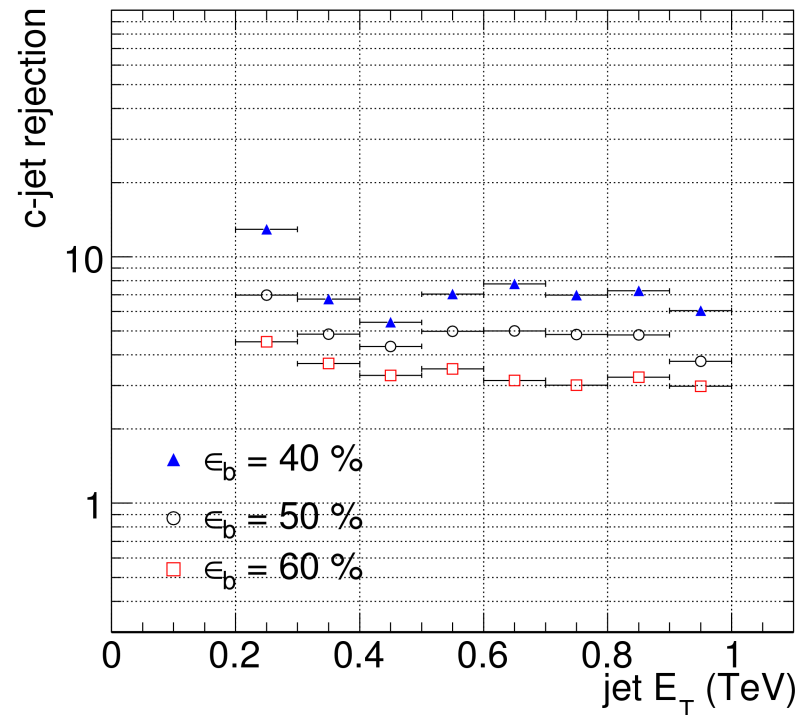
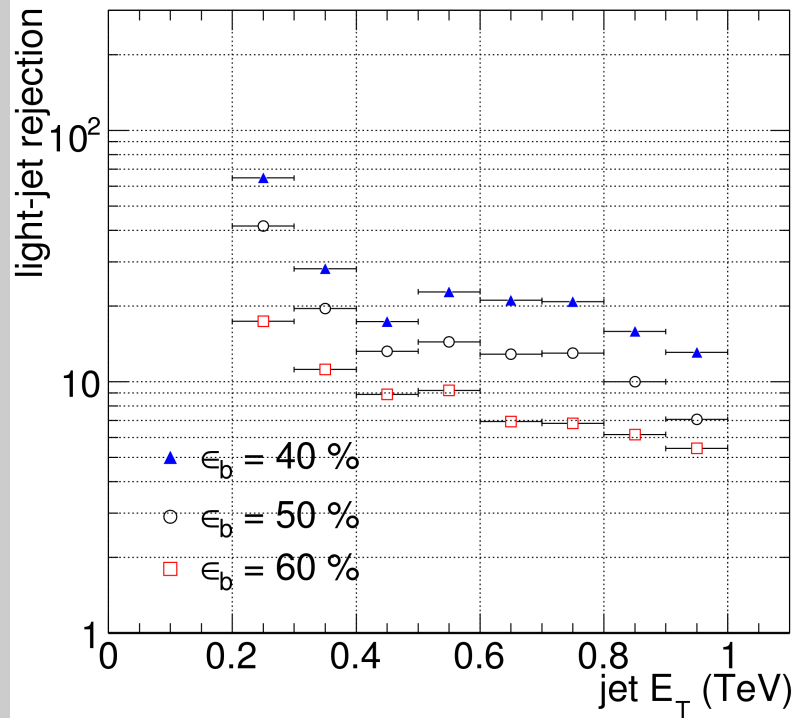
- jet direction no longer as readily identified with B-hadron flight path
- impact parameter sign more often incorrect

● The lifetime signature



Great!!! even more tracks without lifetime...

The lifetime signature

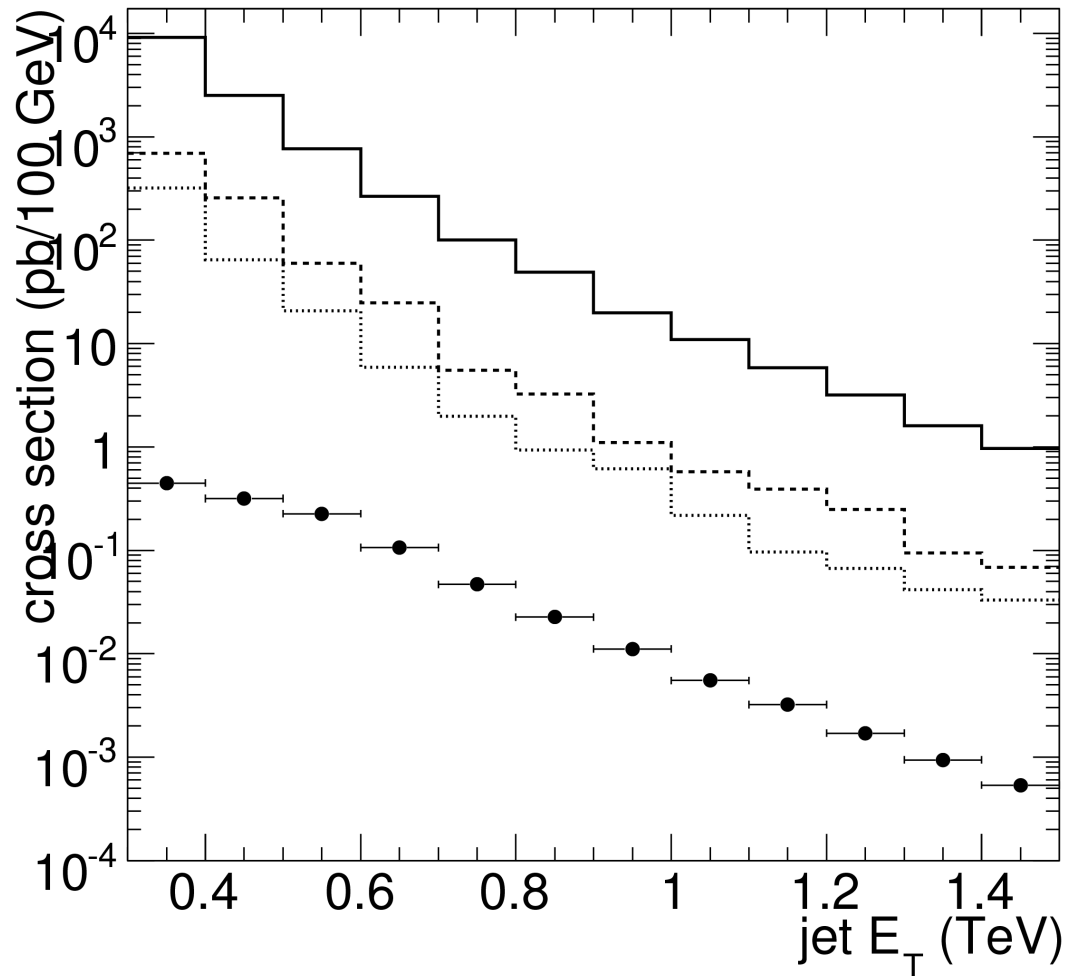


The figures show the hadronic top monojet tagging performance achieved with the SV1 + IP3D algorithm

Performance degraded by “noise from W-decay”

The lifetime signature

— all jets — c-jets ··· b-jets
● hadronic top monojets



The abundance of heavy flavour in nature... (or at least in Pythia)

● **Hadronic top monojet tagging**

Hadronic top monojet topology: decay products from highly boosted top quarks reconstructed as a single jet

Exploring the possibility to use the lifetime signature to isolate (tag) this topology among QCD di-jet background

Required light and charm-jet rejection achievable with an efficiency of 40 %

Next step: combine the analysis with identification methods based on jet substructure



High pT b- and top physics group first “exploratory” phone meeting 29th January

Tuesday 29 January 2008

from 16:00 to 19:05

at Phone (13-2-005)

chaired by:

Gustaaf Brooijmans (Columbia),

Marcel Vos (IFIC Valencia)

[Tuesday 29 January 2008](#) |

High pT b/top

Tuesday 29 January 2008

[top](#)↑

- | | |
|---|---|
| 16:00 Introduction (20) (Slides) | Gustaaf Brooijmans (Columbia University) , Marcel Vos (IFIC Valencia) |
| 16:20 Studies on sample 5201 (15) (Slides) | Erik van der Kraaij |
| 16:35 Studies on Z' vs Light Jets: Jet Mass and YSplitter (15) (Slides) | Gustaaf Brooijmans (Columbia University) |
| 16:50 Highly boosted top reconstruction (15) (Slides) | Akira Shibata (New York University) |
| 17:05 Electron ID (15) (Slides) | Denver Whittington |
| 17:20 Z' -> tt Study (15) (Slides) | Ben Smith (Harvard University) |
| 17:35 B-tagging Studies (15) (Slides) | Vivek Jain (Indiana University) |
| 17:50 Tops in SUSY (15) (Slides) | Christophe Clement (CERN) |
| 18:05 Phase Space Studies in samples 6230-6234 (15) (Slides) | Florian Hirsch (Universitat Dortmund) |
| 18:20 W' -> tb in Twin Higgs (15) (Slides) | Manouk Rijpstra (NIKHEF) |
| 18:35 Valencia Plans (15) (Slides) | Marcel Vos (IFIC Valencia) |
| 18:50 high pt top reconstruction for top antitop resonance search (15) (Slides) | Dominique Pallin (Laboratoire de Physique Corpusculaire (LPC)) |



IFIC

