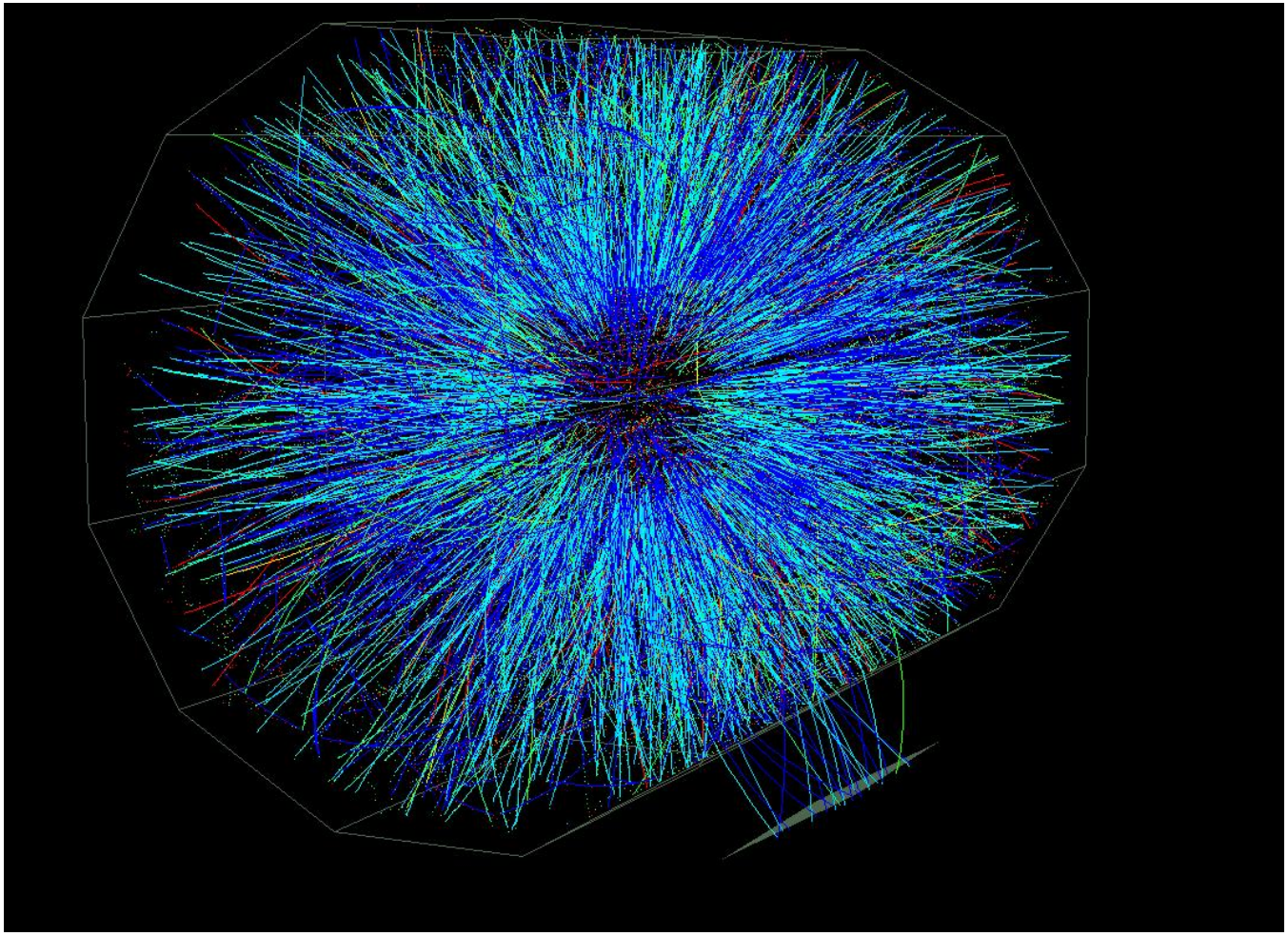
Using of the L3 RICH Trigger during 2001 Run.

Jens Berger

University of Frankfurt

STAR L3 Trigger Group



Ring Imaging Cherenkov (RICH) Detector

- Small acceptance: |eta| <= 0.275 , phi = −50 to −70 deg.
- Identifies high momentum π, k, p.
- Main physics goal: $\bar{p}/p$ ratio.

<u>Problem:</u>

Only a small fraction of particles produced in a central Au + Au collision traverse the RICH.

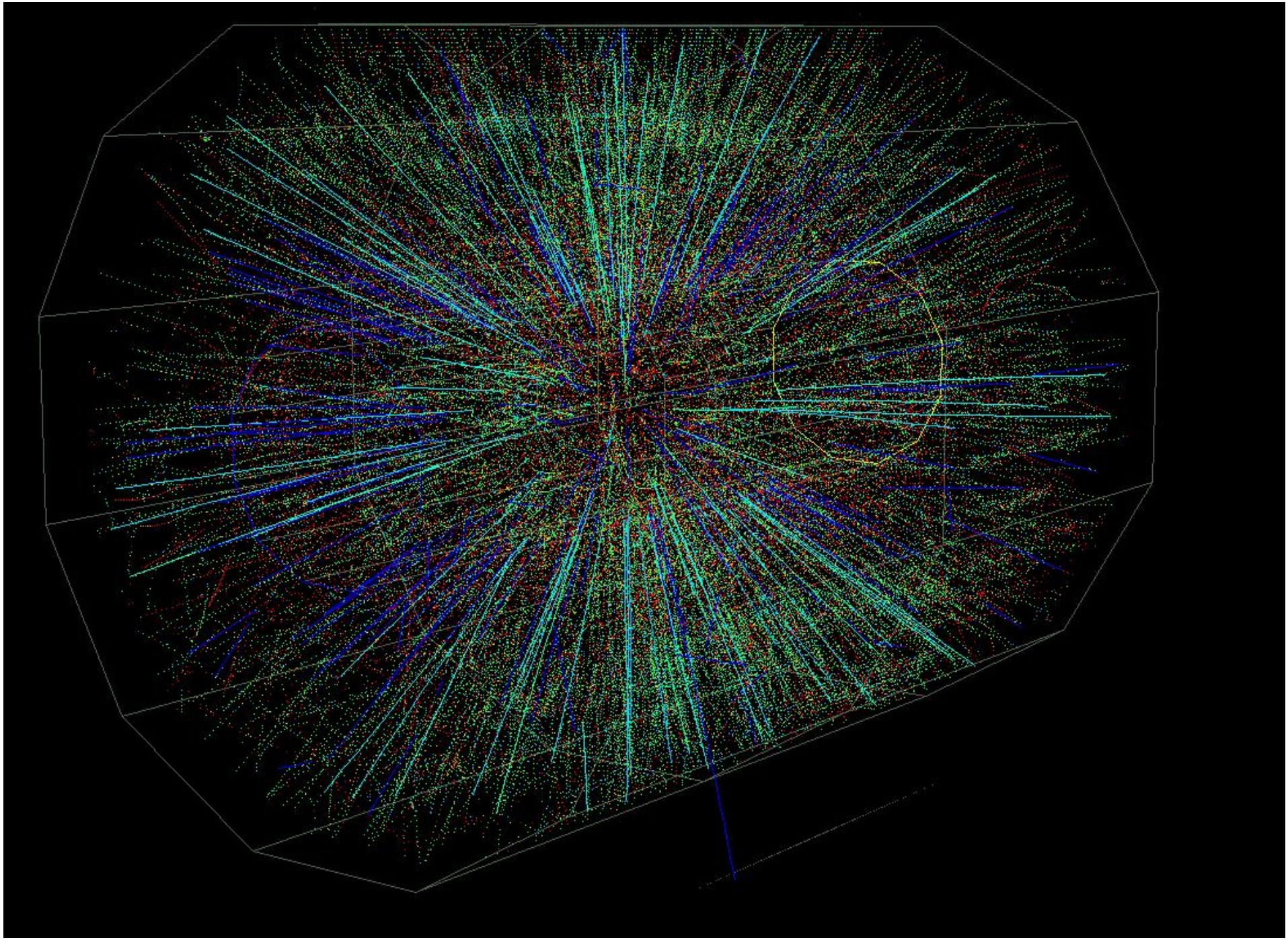
L3 Trigger

- Performs online reconstruction of central Au+Au events at a rate of ~50 Hz.
- Use L3 to enrich the sample of events with high P particles traversing the RICH.

L3 Trigger algorithm for the RICH:

- Event z vertex: |Vz| < 25 cm.
- At least one high momentum track (P > 2.7 GeV/c) extrapolated to the RICH with more than 20 Hits.
- Tracks with a DCA3d < 10 cm and |eta|<0.3 are extrapolated.
- Those criteria define a RICH candidate, If criteria are fulfilled –> L3 RICH algorithem TRIGGERS.

L3 tracks P>1.5 GeV/c displayed, one P=3 GeV/c track pointing to the RICH.



Analysis on 2001 Data

- ProductionCentral:
  - Efficiency vs. Offline of the L3 RICH Trigger.

L3 Trigger used last three weeks of running,
for ZDC rates > 600,1200 Hz

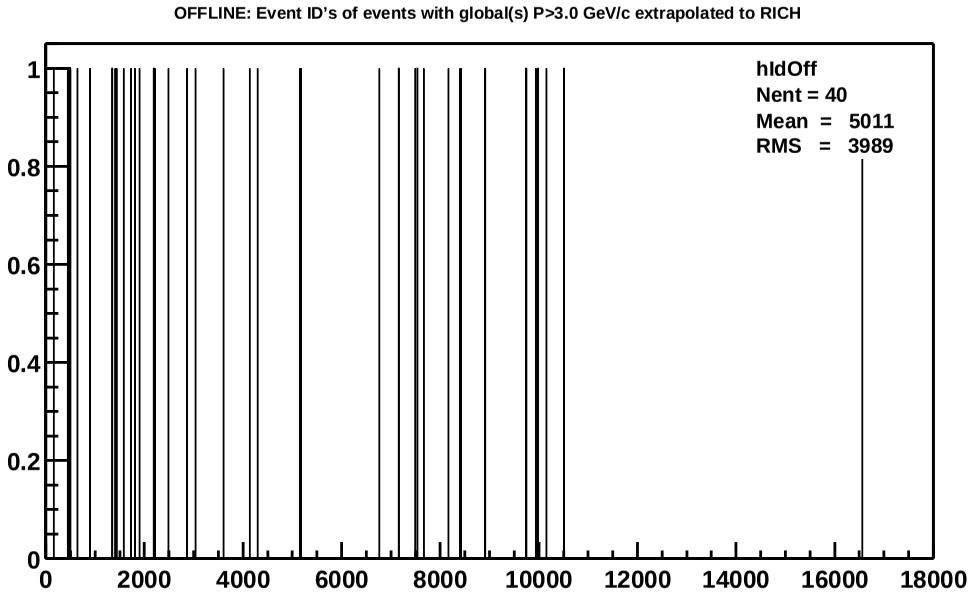
- ProductionCentral600, 1200
  - RICH candidates above P>3 GeV/c.
  - Rates and enhancement.

Efficiency L3 vs. Offline

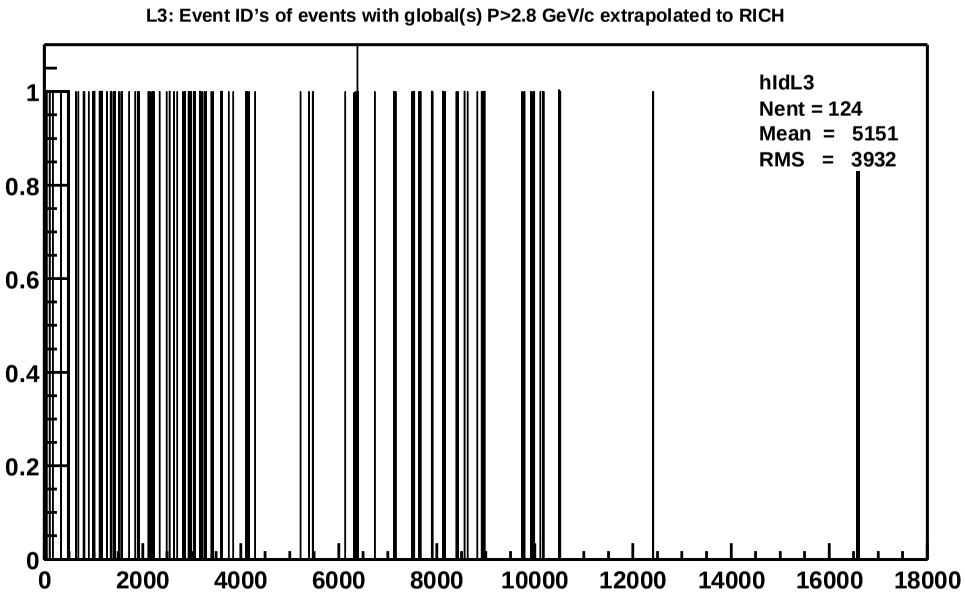
- Results from productionCentral: run 2291032.
- Total of 3640 central events analysed.
- L3 , Offline candidates were compared.
- L3 candidate:
  |Vertex z| < 25 cm,
  nHits > 20, Pt > 2.7 GeV/c, $|\eta|<0.3$, DCA<10 cm.
- Offline candidate (RICH group cuts):
  |Vertex z| < 25 cm,
  nFitPoints>22, Pt>3 GeV/c, $|\eta|<0.3$, DCA < 8 cm.

Event ID's of Offline, L3 Candidates pointing to the RICH

Offline



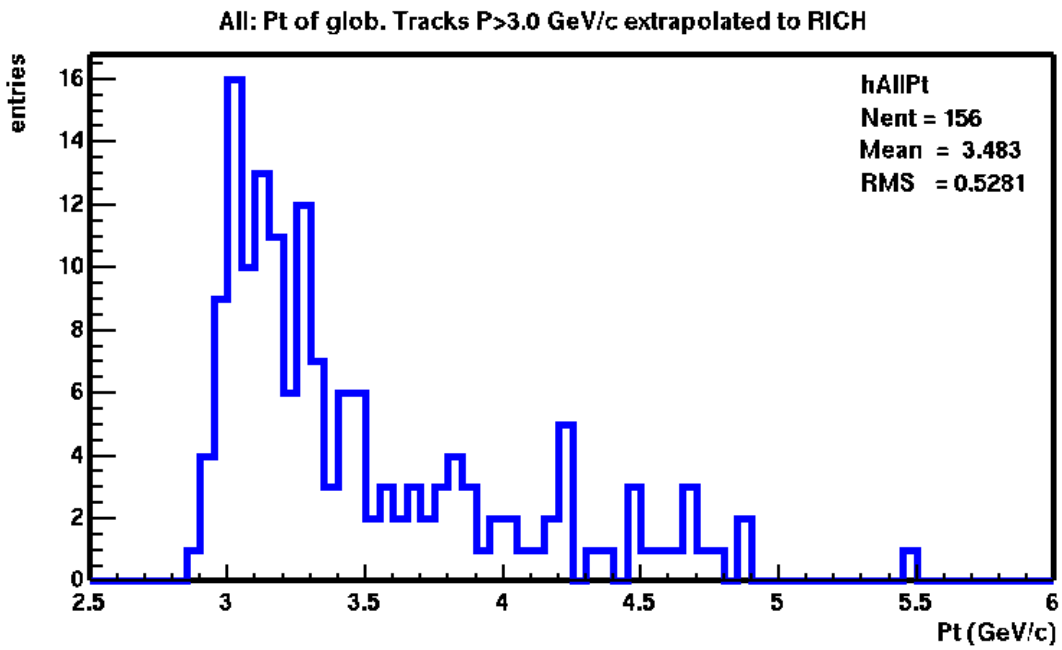
L3



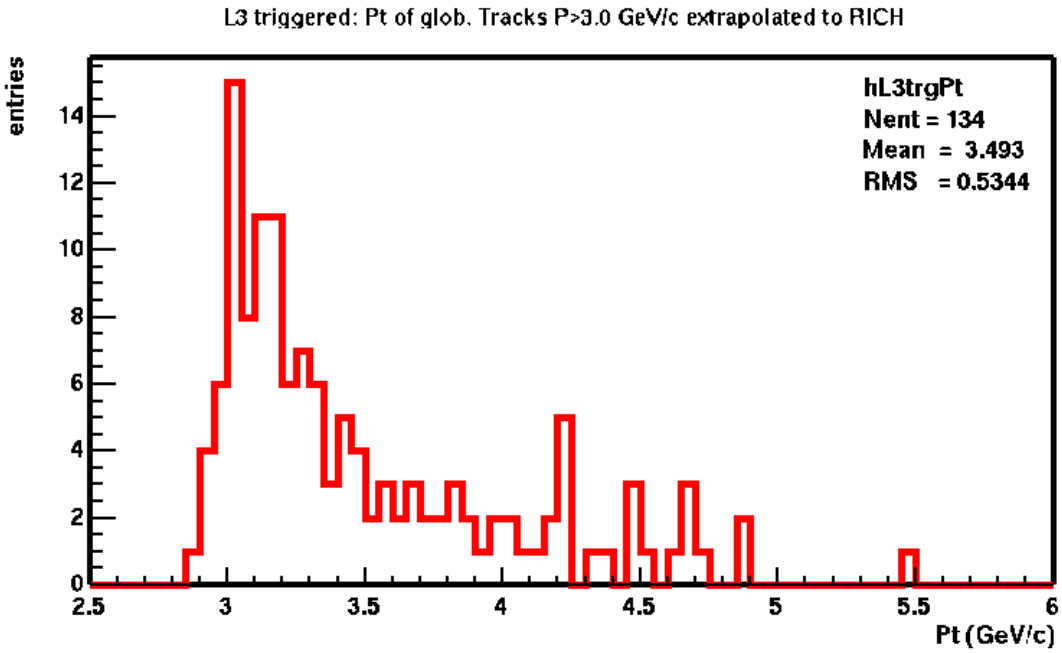
- Plots show ID's of events with at least one RICH candidate. Candidates found Offline and with L3 were compared.
- Candidates Offline: 40
- Candidates L3 :124
- L3 no match : 91
- L3 , Offline match : 33
- L3 / Offline = 83%
- L3 no match / L3= 74 %

Pt of All, Triggered Candidates

All



L3



- L3 RICH was USED, productionCentral600 prescale = 2
- Run 231300, 8728 events
- L3 Triggered events :638 –> 7.3 %
- Candidates Offline :156
- Candidates offline & L3 Triggered :134

Rates and Enhancement

ProductionCentral:
Every 91th event a RICH candidate −> 1.1 %

ProductionCentral600 (L3 Triggered, prescale = 2):
Every 55th event a RICH candidate −> 1.8 %

ProductionCentral1200 (L3 Triggered, prescale = 5):
Every ~24th event a RICH candidate ~> 4.2 %

Hadronic central events: 3M ~> 33k RICH candidates
productionCentral600 :386k ~> 7k RICH candidates
productionCentral1200 : 93k ~> 4k RICH candidates

Year 2001: total of ~ 44,000 RICH candidates.

Request for production of runs recorded Nov 9 −24.