Backgrounds in charm and beauty secondary vertex analysis

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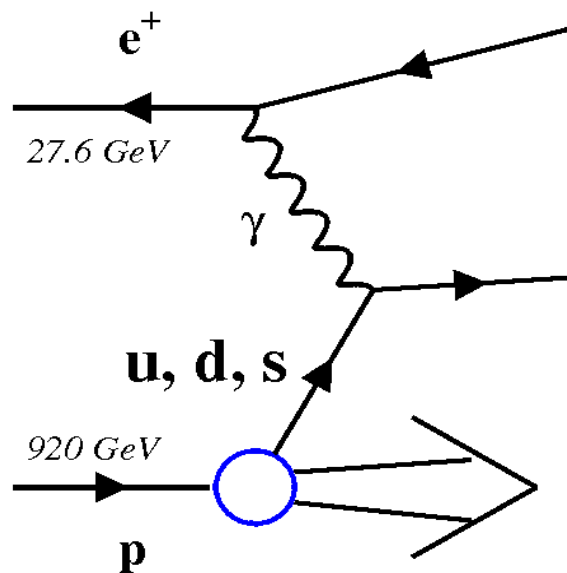Supervisors: Olaf Behnke and Vladyslav Libov
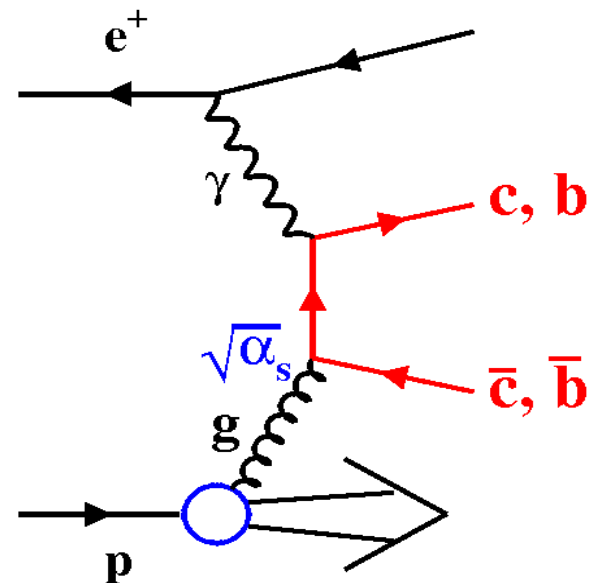Summer Student Session
September 8, 2011

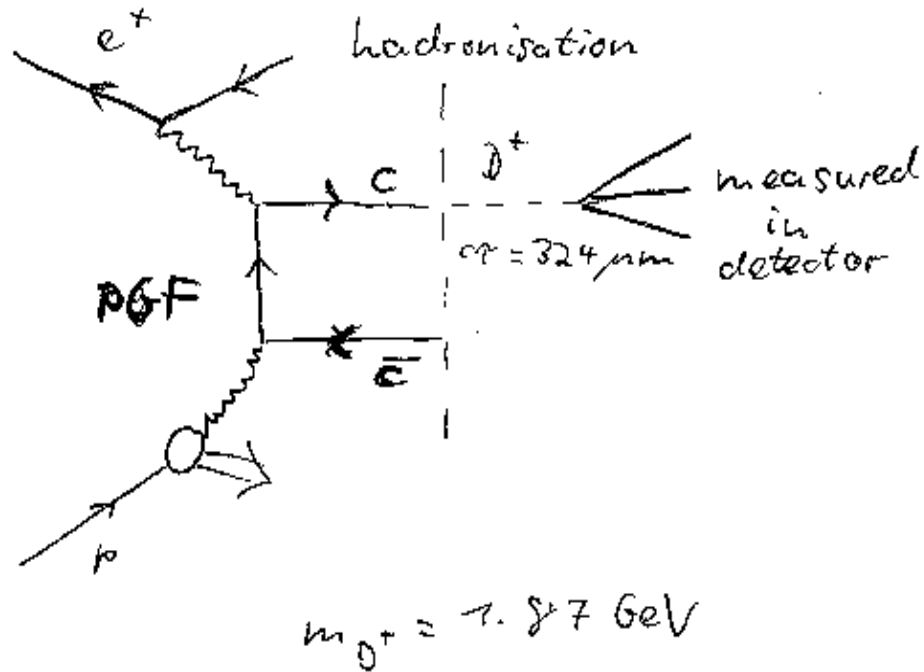# motivation for c and b analysis
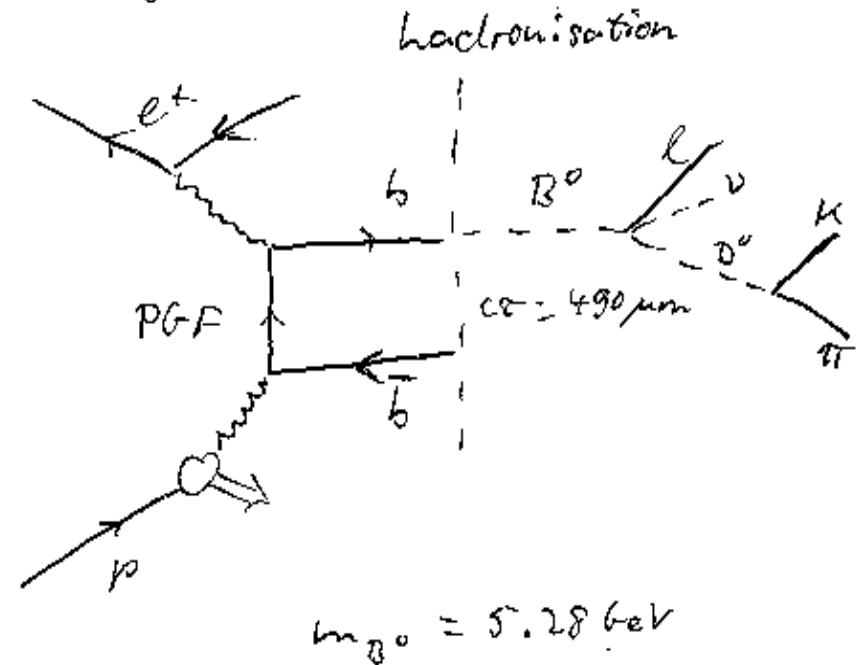
quark parton model

photon gluon fusion

PGF directly sensitive to gluon density in proton and prove for pertubative quantum chromodynamics
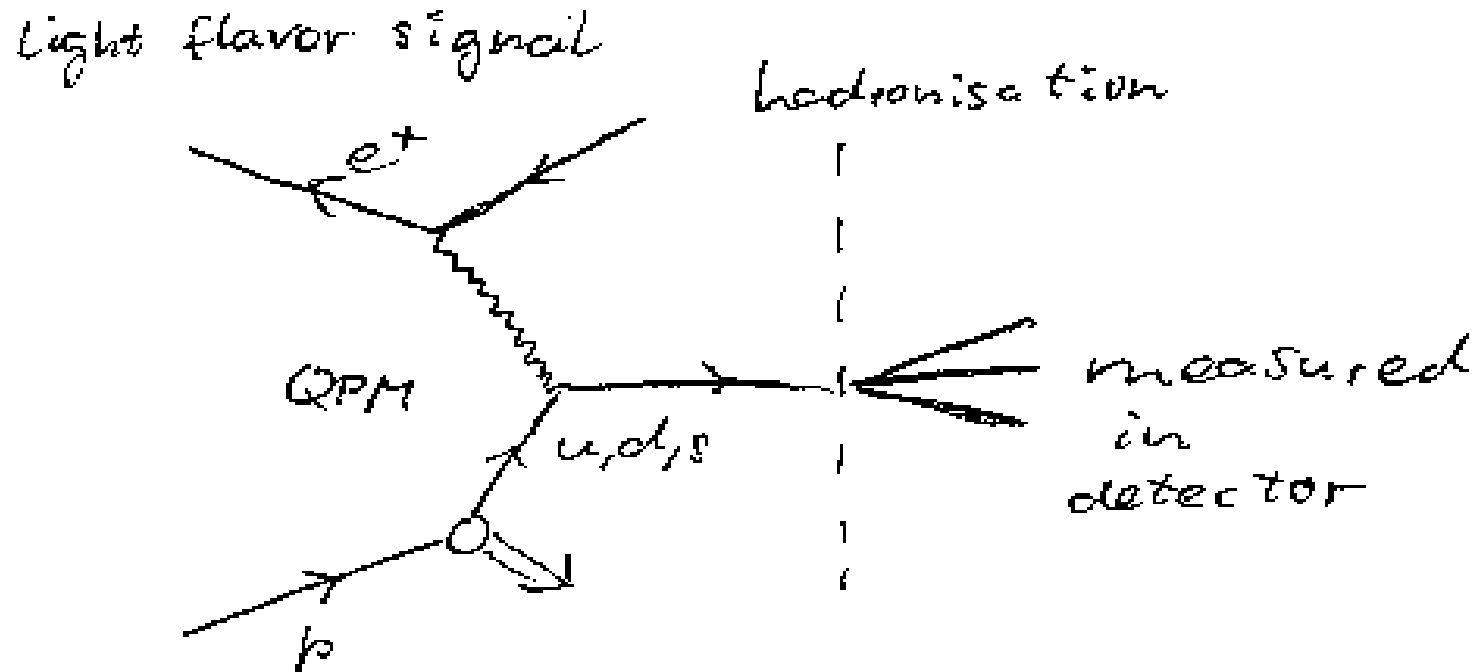
experimental c and b identification

displaced c and b secondary vertices

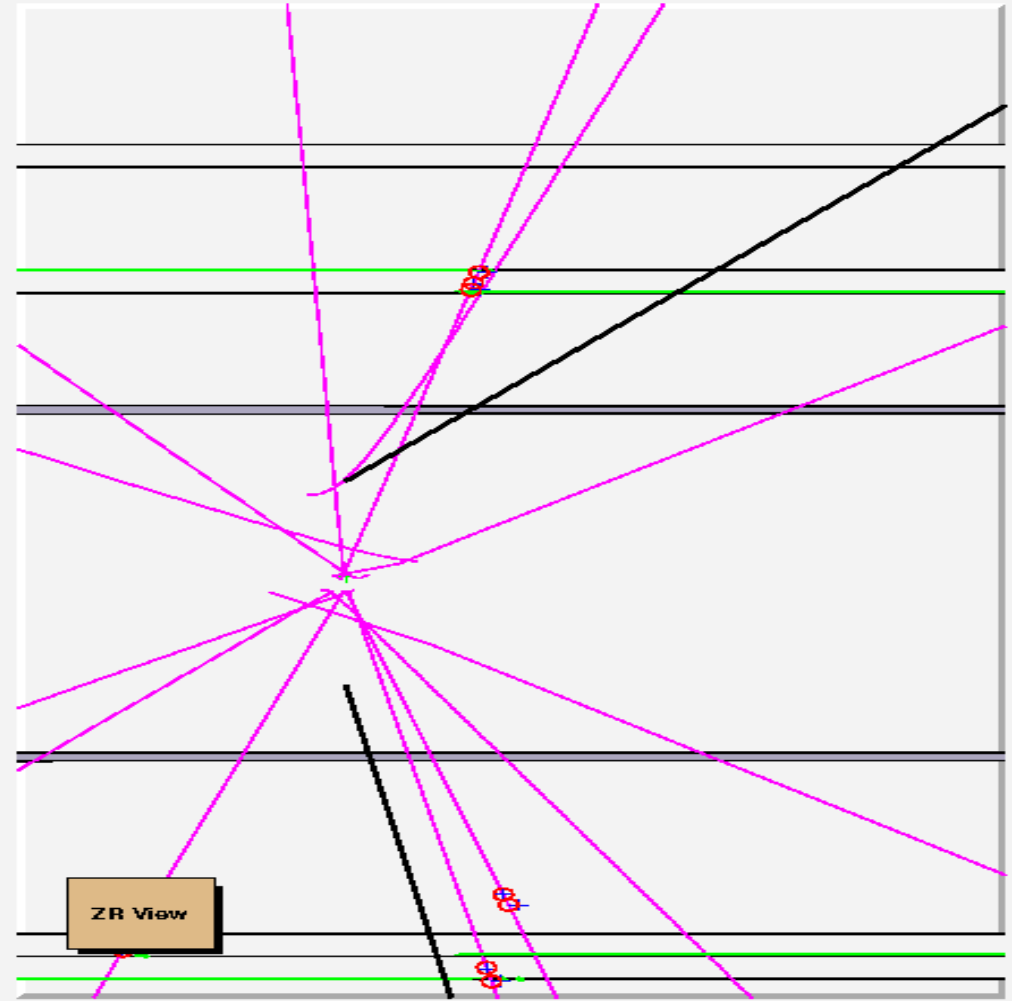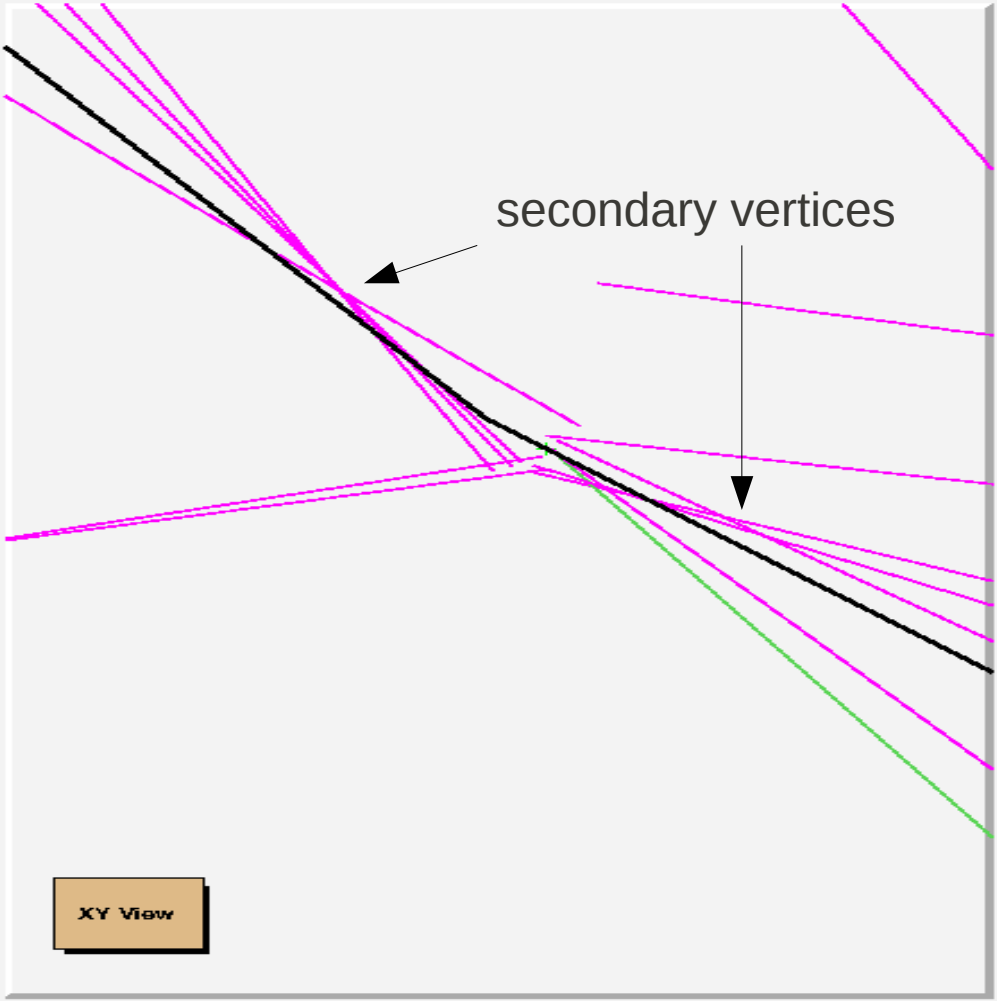# experimental light flavor identification

light flavor signal

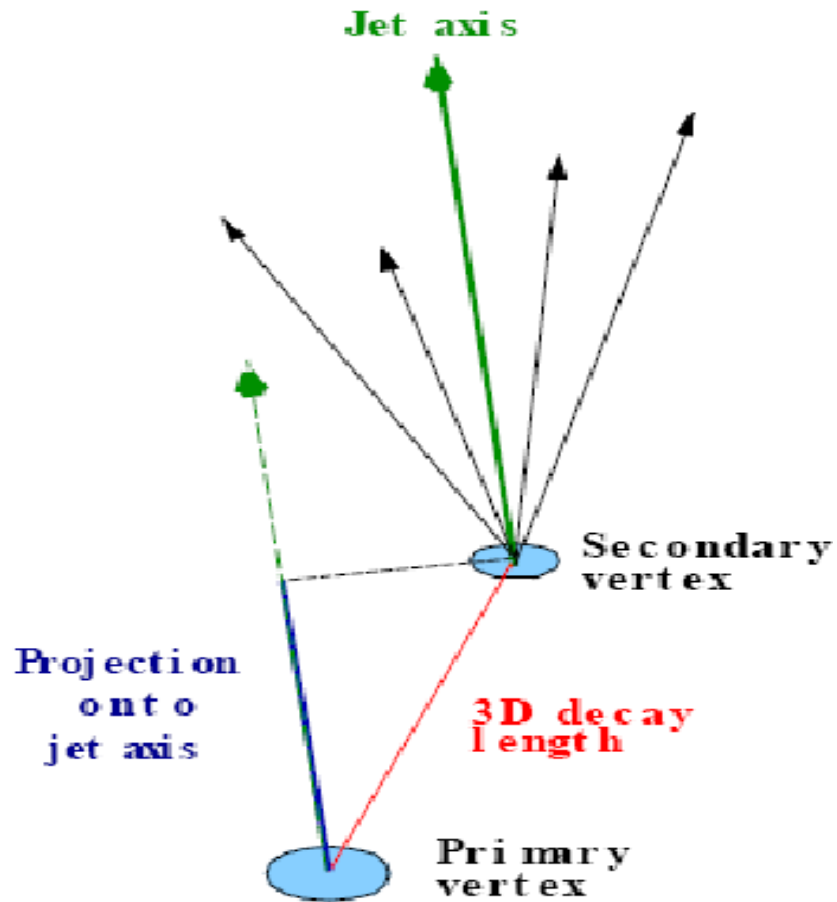hadronisation

e^+

QPM

u,d,s

p

measured in detector

light flavor background

ZEUS b event display

Zeus Run 56350 Event 325169   date: 20-09-2005   time: 19:34:00
E_e^{SIRA}=5.89 GeV θ_e^{SIRA}=2.54 ϕ_e^{SIRA}=-2.89 $Prob_e^{SIRA}$=0.954 $x_{e,DA}^{SIRA}$=0.00
$y_{e,DA}^{SIRA}$=0.60 $Q_{e,DA}^{2,SIRA}$=117.3 GeV^2

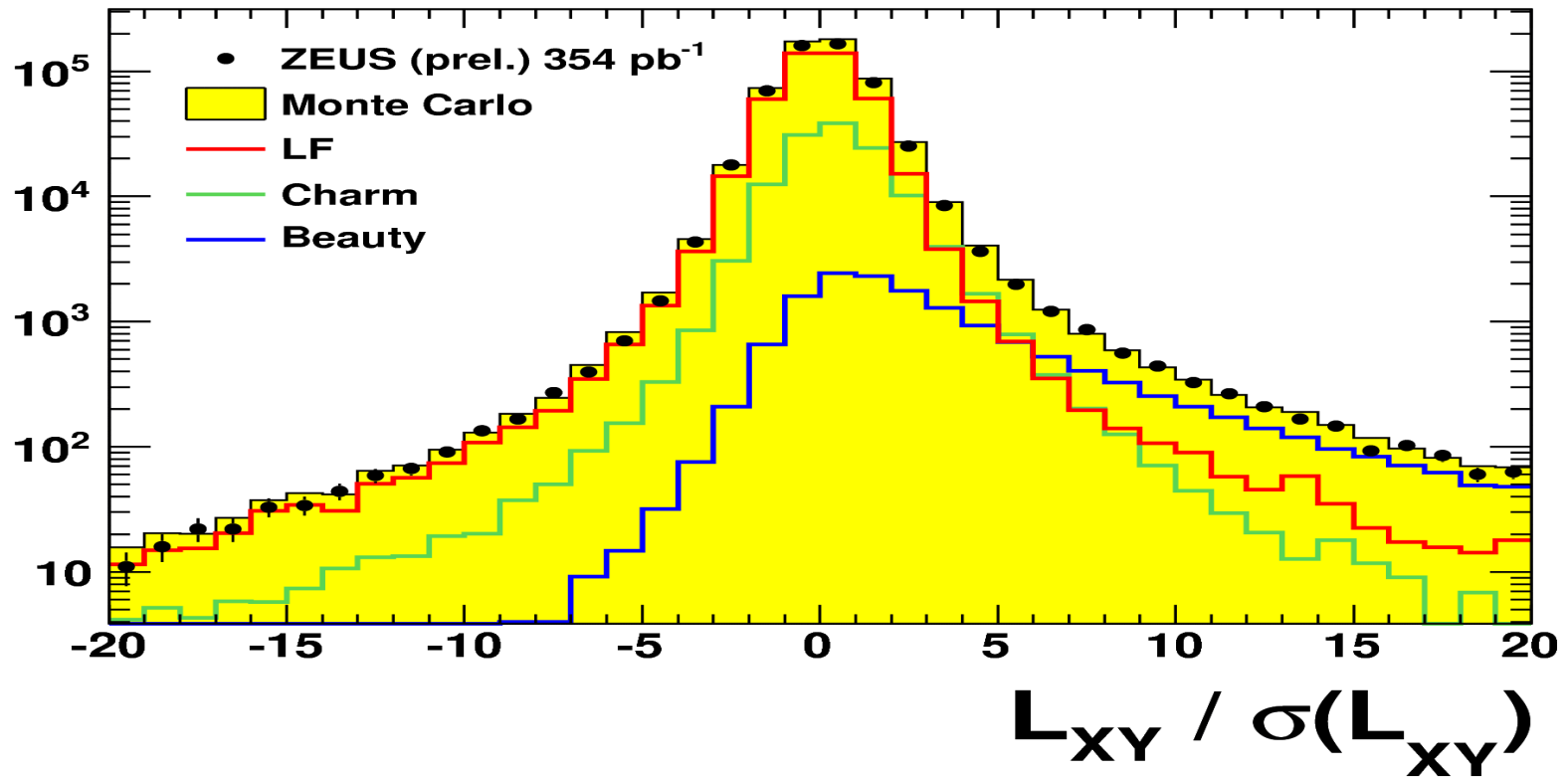secondary vertices

XY View

ZR View

secondary vertex analysis

significance =
decay length /
decay length error

ZEUS and Monte-Carlo data
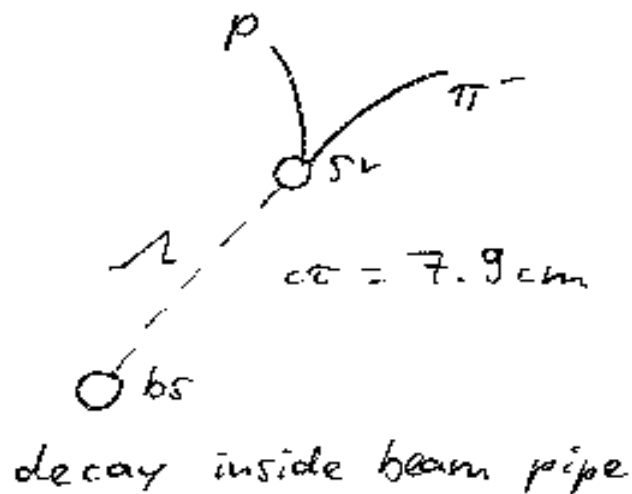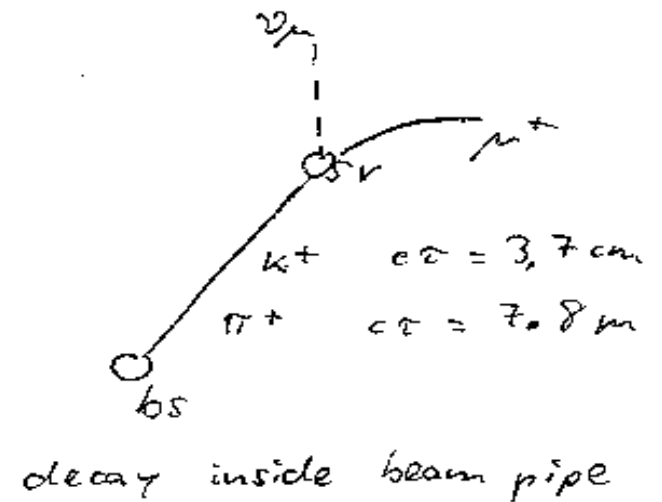

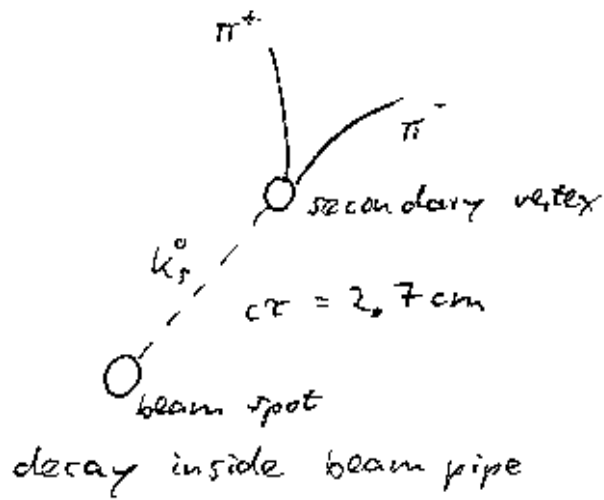*asymmetric significance distribution*

mirrored significance
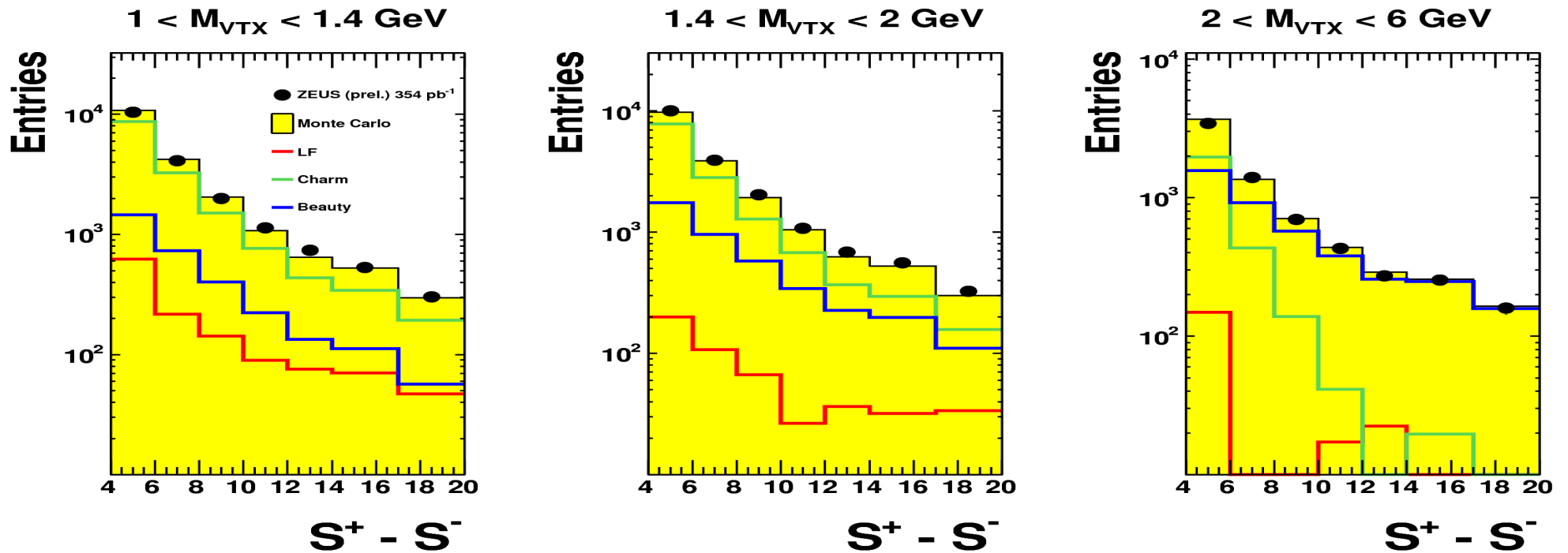
try to understand the light flavor asymmetry
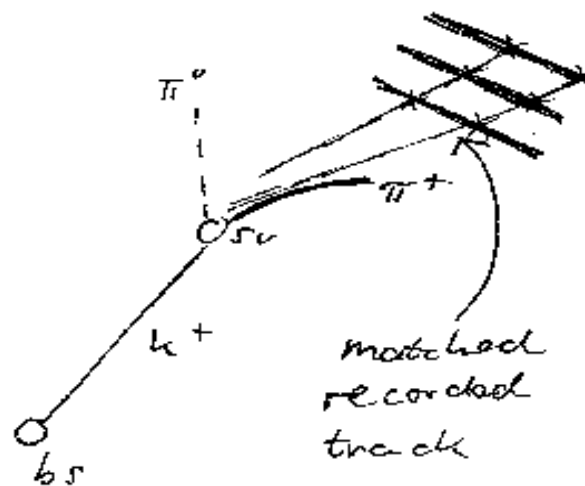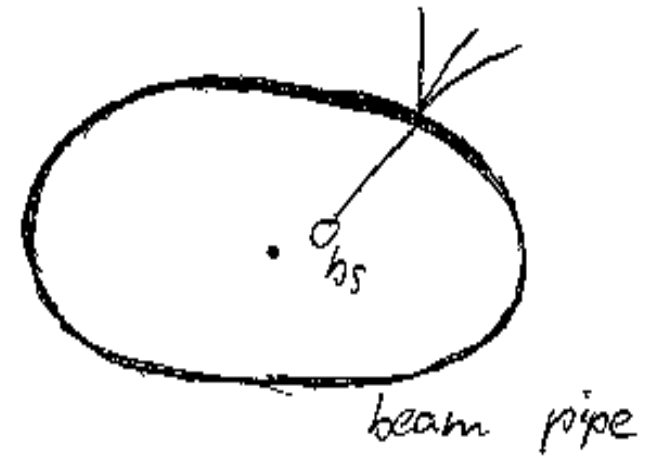
possible background sources

- K0s $\rightarrow$ π+ + π−
- Λ $\rightarrow$ p + π−
- Λ $\rightarrow$ n + π0
- π+ $\rightarrow$ μ+ + $\nu\mu$
- K+ $\rightarrow$ μ+ + $\nu\mu$
- K+ $\rightarrow$ π+ + π0
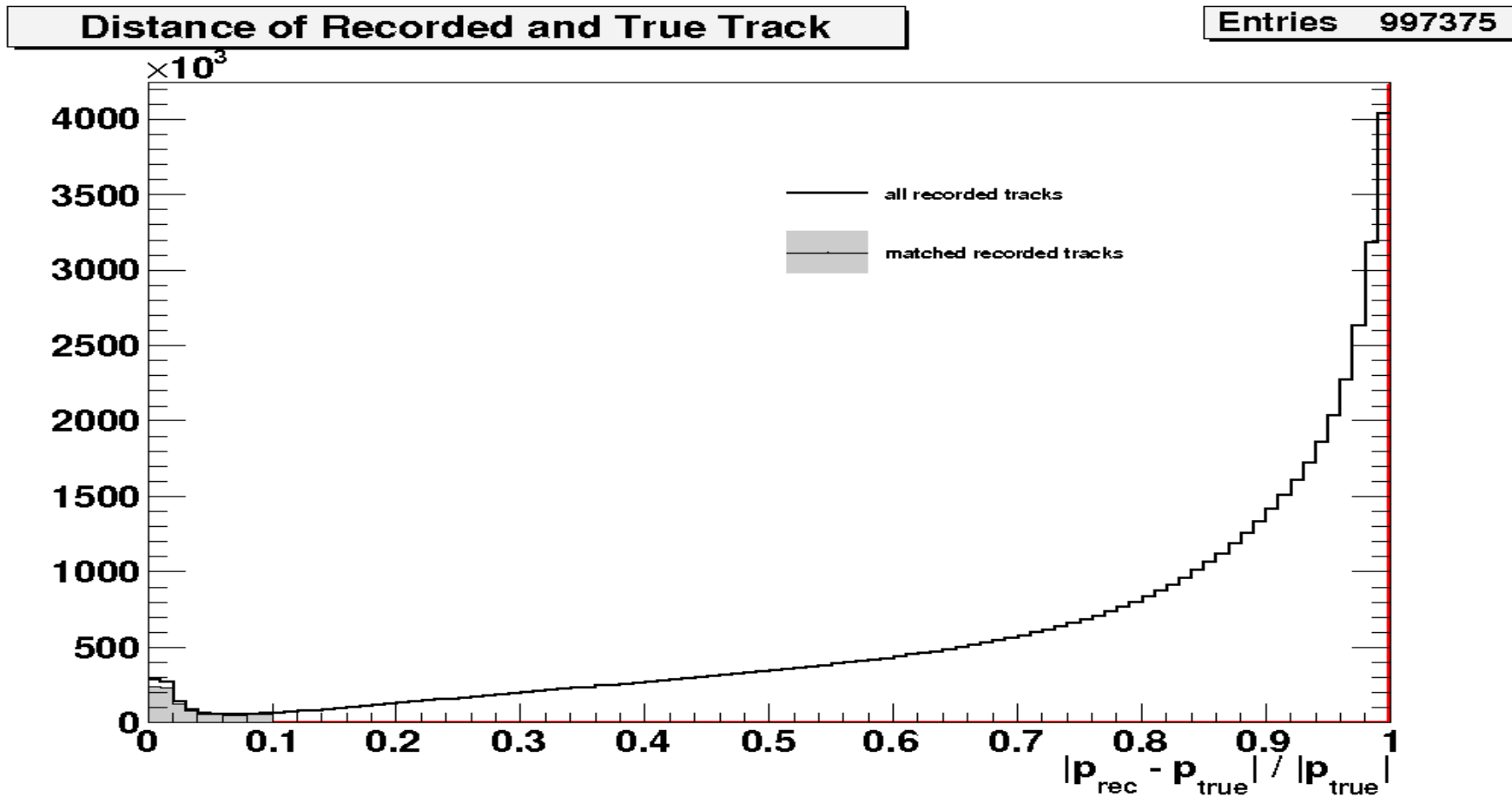- corresponding antiparticle decays
- Hadronic Interactions
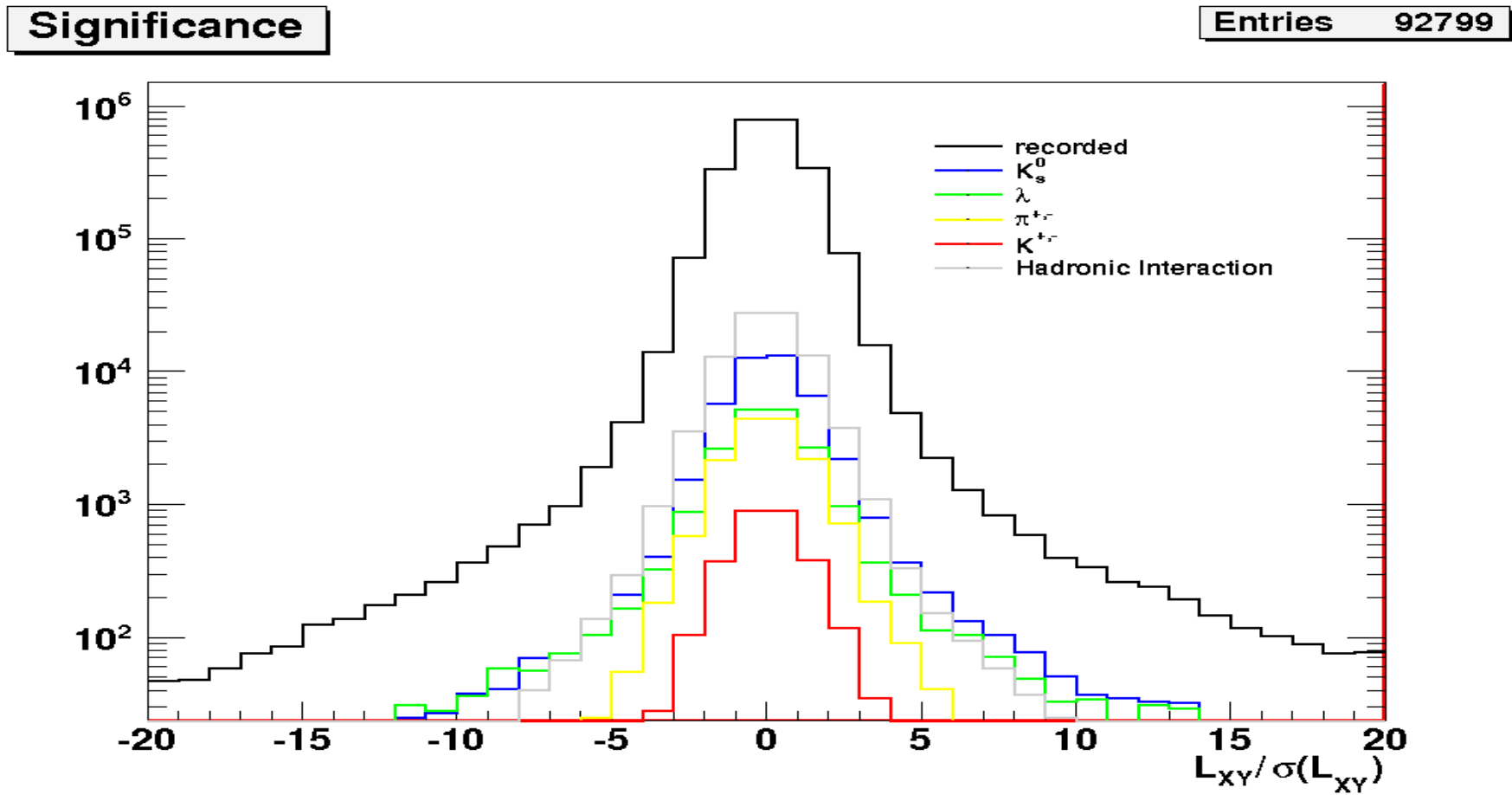
light flavor decays

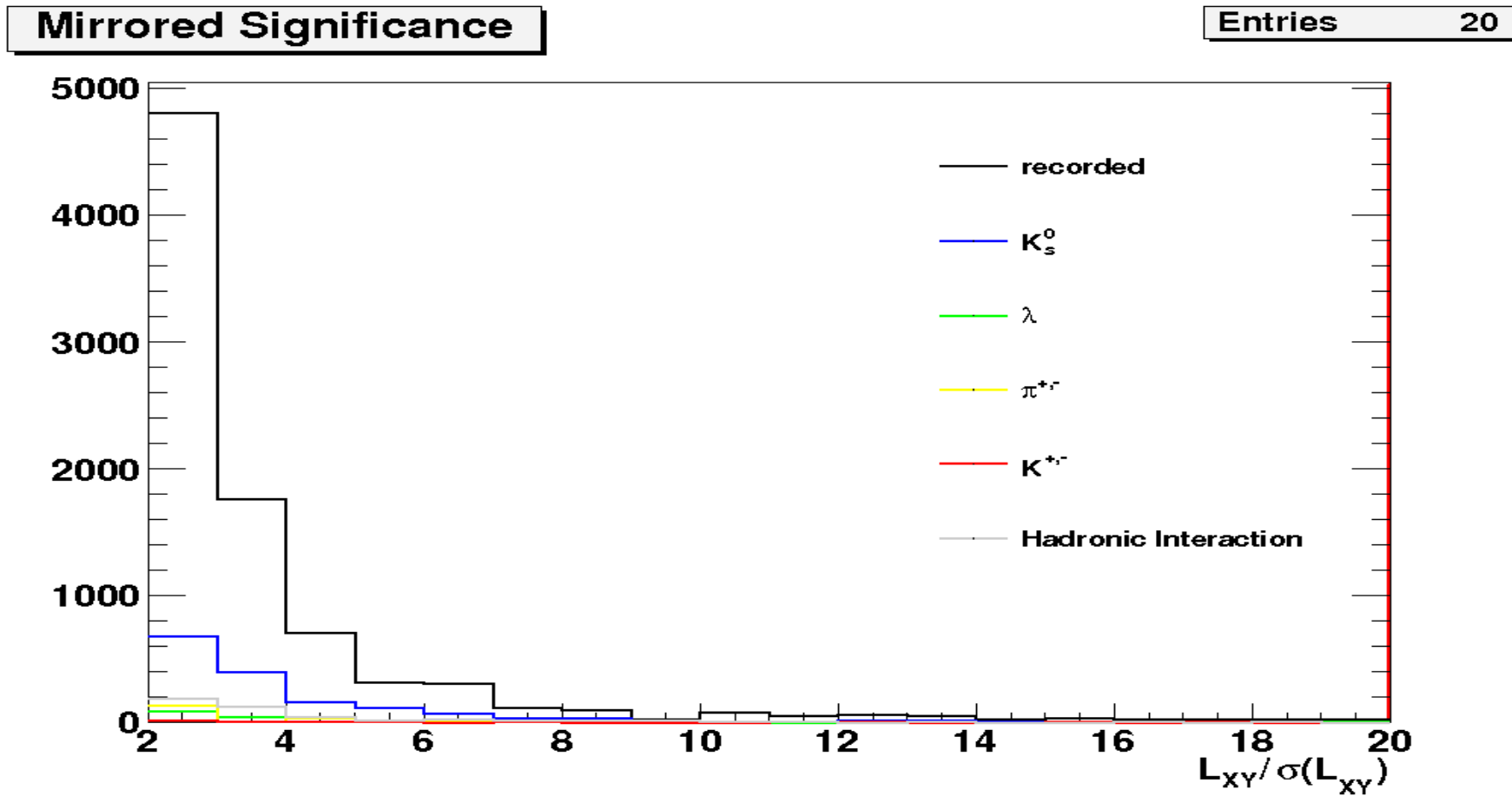# deays and track matching
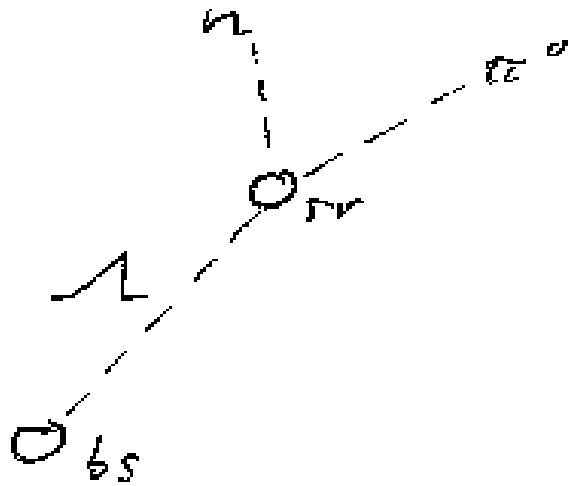
track matching results

light flavor MC significance

mirrored significance > 2

mirrored significance > 4
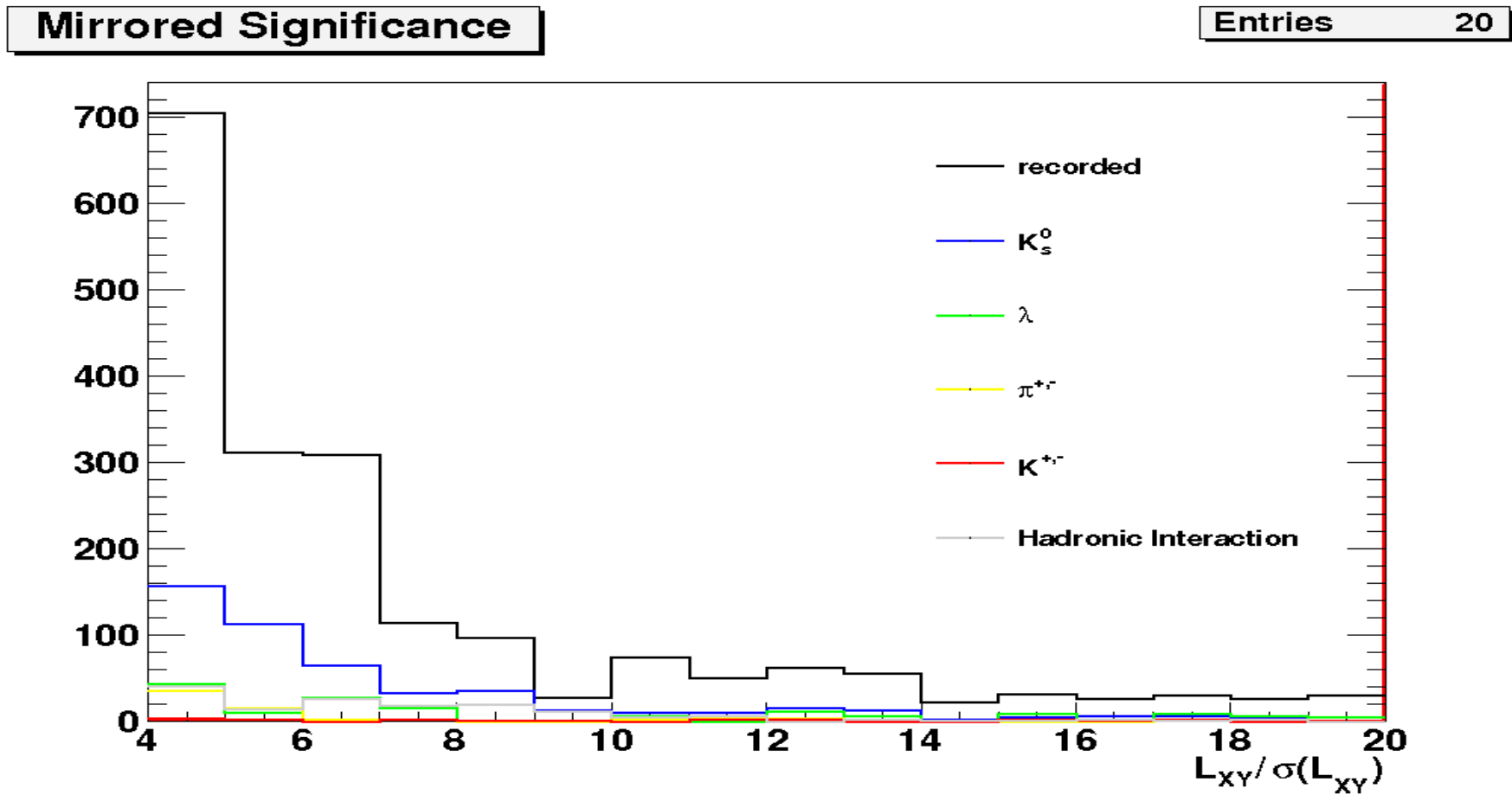
summarized results

integrated significance > 4

recorded	1
K0s	0.250758
Λ	0.0717897
π+,-	0.0338726
K+,-	0.00859454
Nuclear Interaction	0.0758342

conclusion

- K0s, Λ and π+,- contribute more than 1/3 to the significance asymmetry

- K+,- does not contribute

- the contribution from Hadronic Interations is not clarified yet but seems to be interesting

Thanks to Olaf Behnke and Vladyslav Libov for
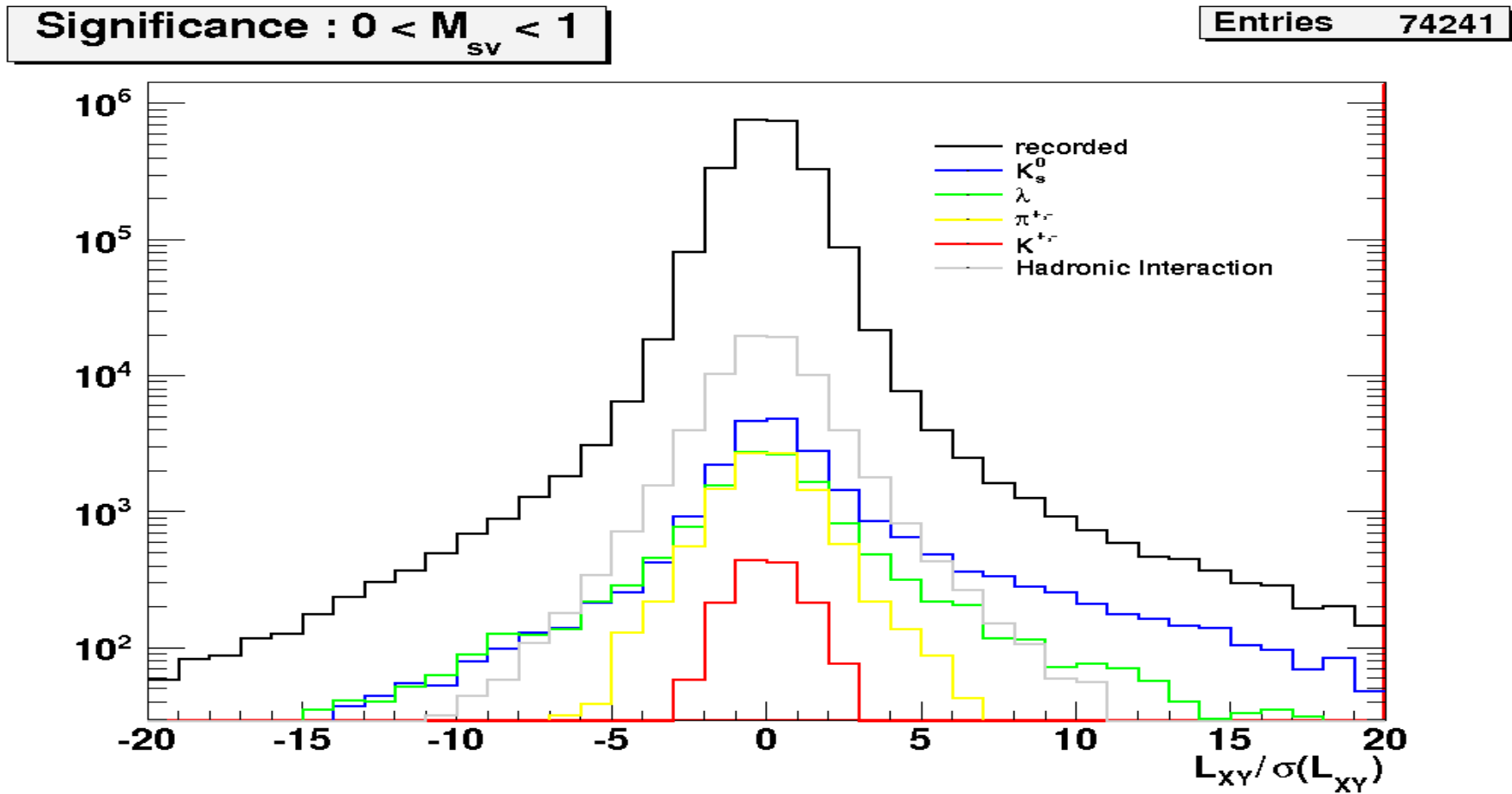making time for me, your friendly help
and interesting talks.
Thanks to Ganna Dolinska for help on
programming.
Thanks to all the people who are involved in the
summer student program, especially
the organizers Olaf Behnke, Andrea Schrader and
Doris Eckstein, the lecturers and all
the summer students of course, for a great time.

significance for 0 < Msv < 1

mirrored significance > 4

Mirrored Significance : $0 < M_{sv} < 1$

Entries 20

recorded
K_s^0
λ
$\pi^{+,-}$
$K^{+,-}$
Hadronic Interaction

$L_{XY}/\sigma(L_{XY})$