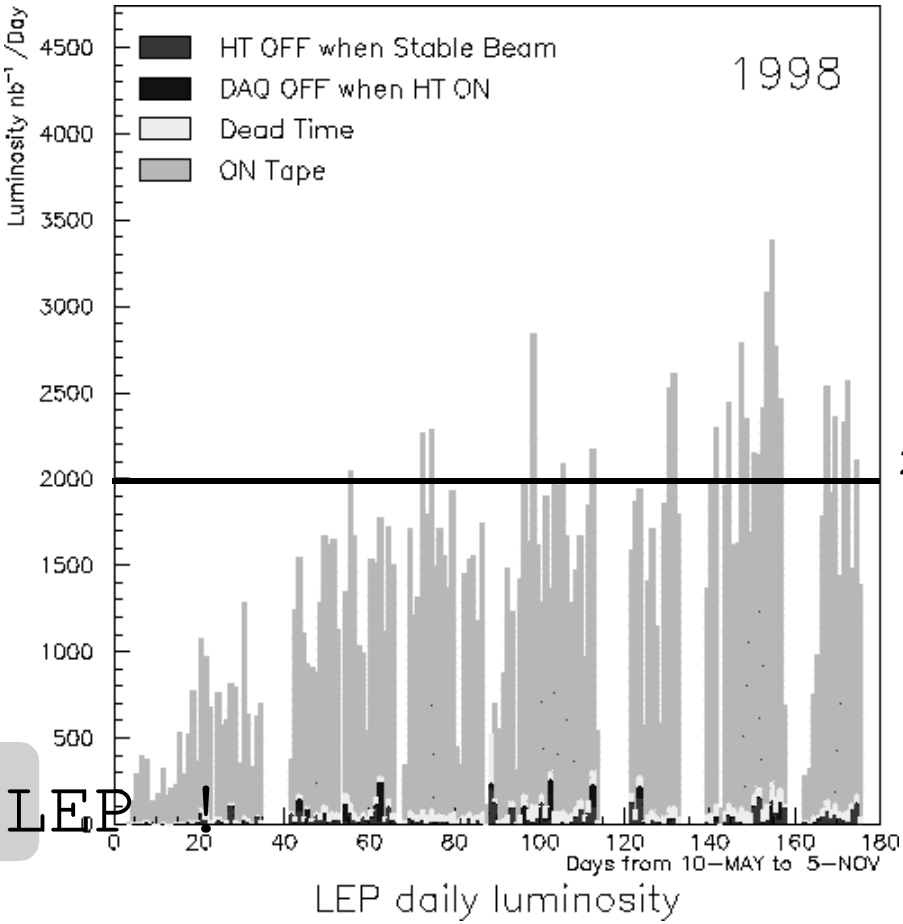
ALEPH Status Report

Eric Lan on

CERN and CEA-Saclay

Integrated luminosity

	Delivered (pb^{-1})	On Tape (pb^{-1})	Efficiency
	3.3	3.1	95.0%
89 GeV	192.7	179.4	93.1 %

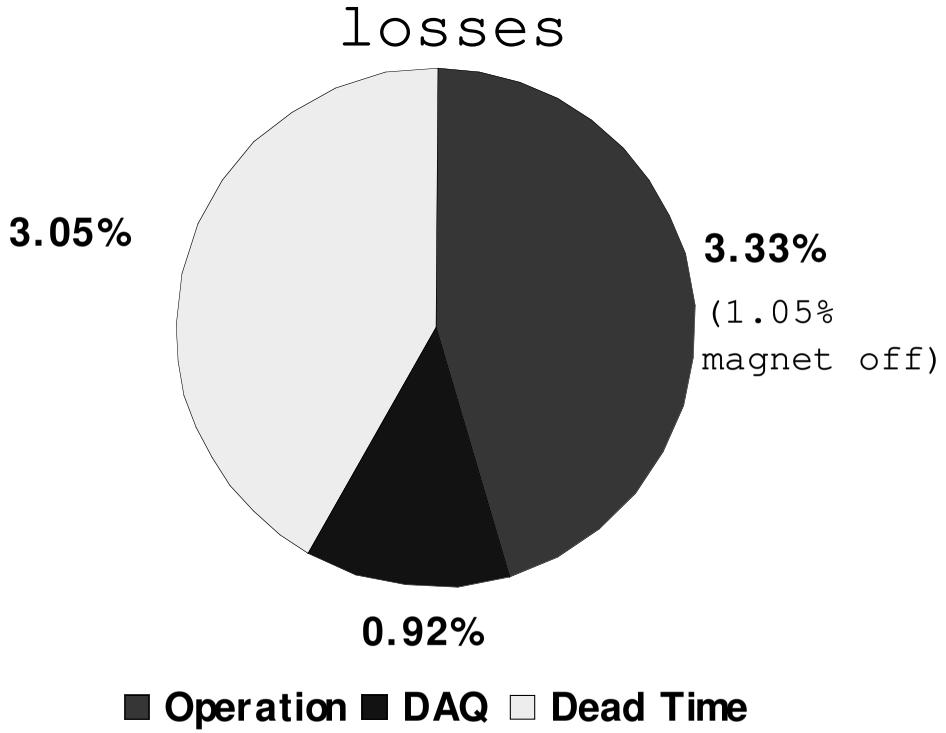


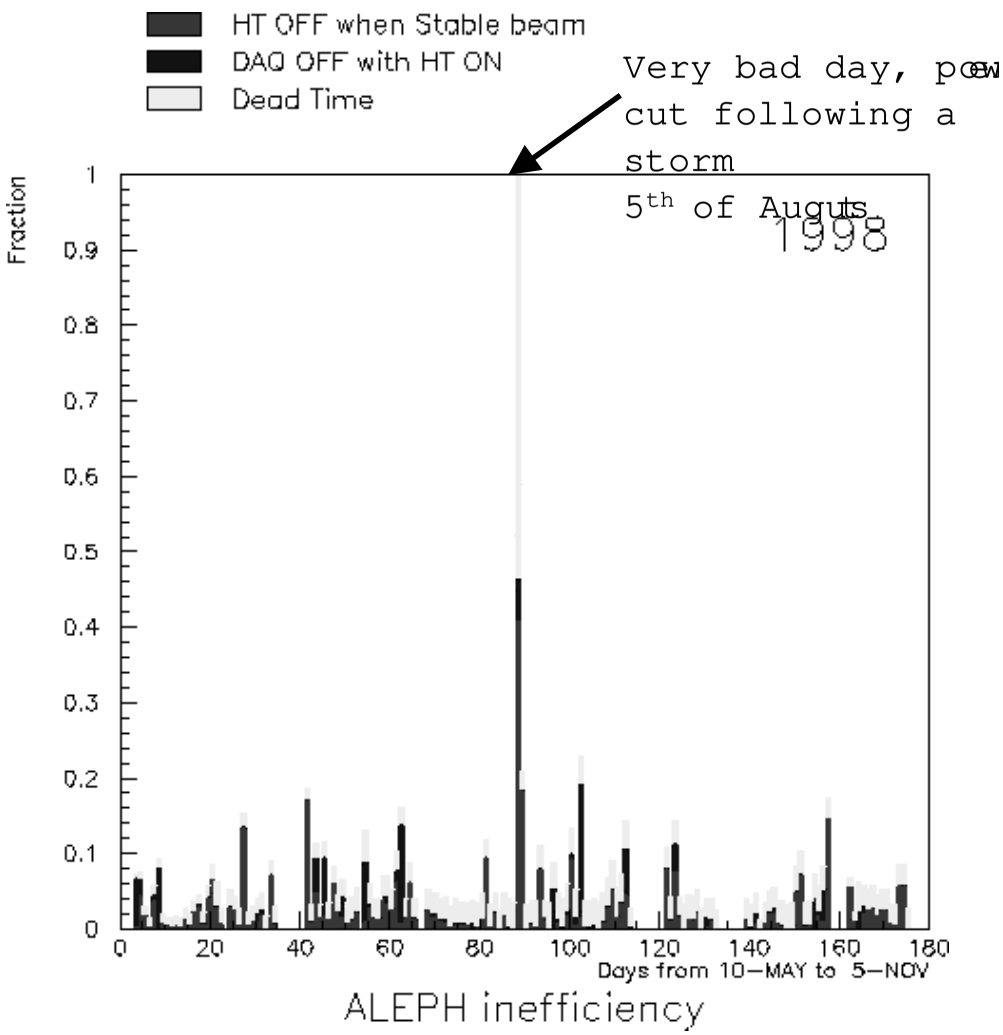
2 pb−1/

LEP daily luminosity

Congratulations to LEP !

Small inefficiencies



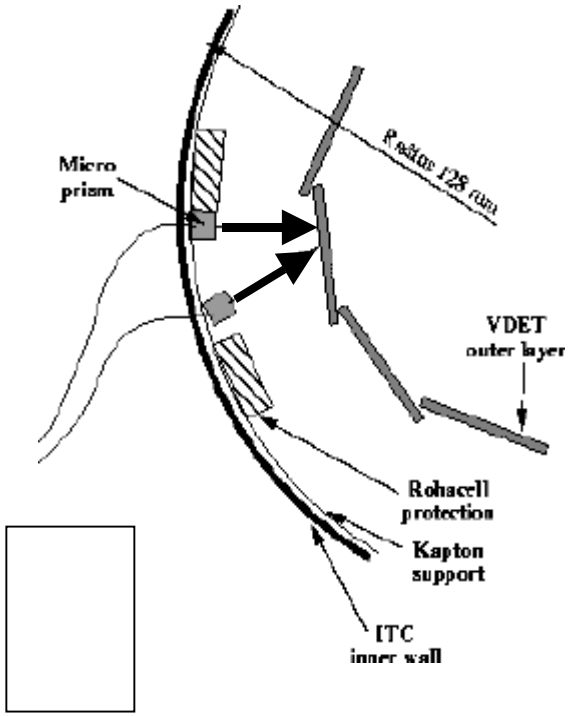


Efficiency = 93.1 %

VDET Rotation - 1

Laser spots on wafers

(outer layers)



Scale

20x20 μm^2

Transverse vi

1998

time

Laser spot impacts movements on VDET

Side A

Effective fit rotation point

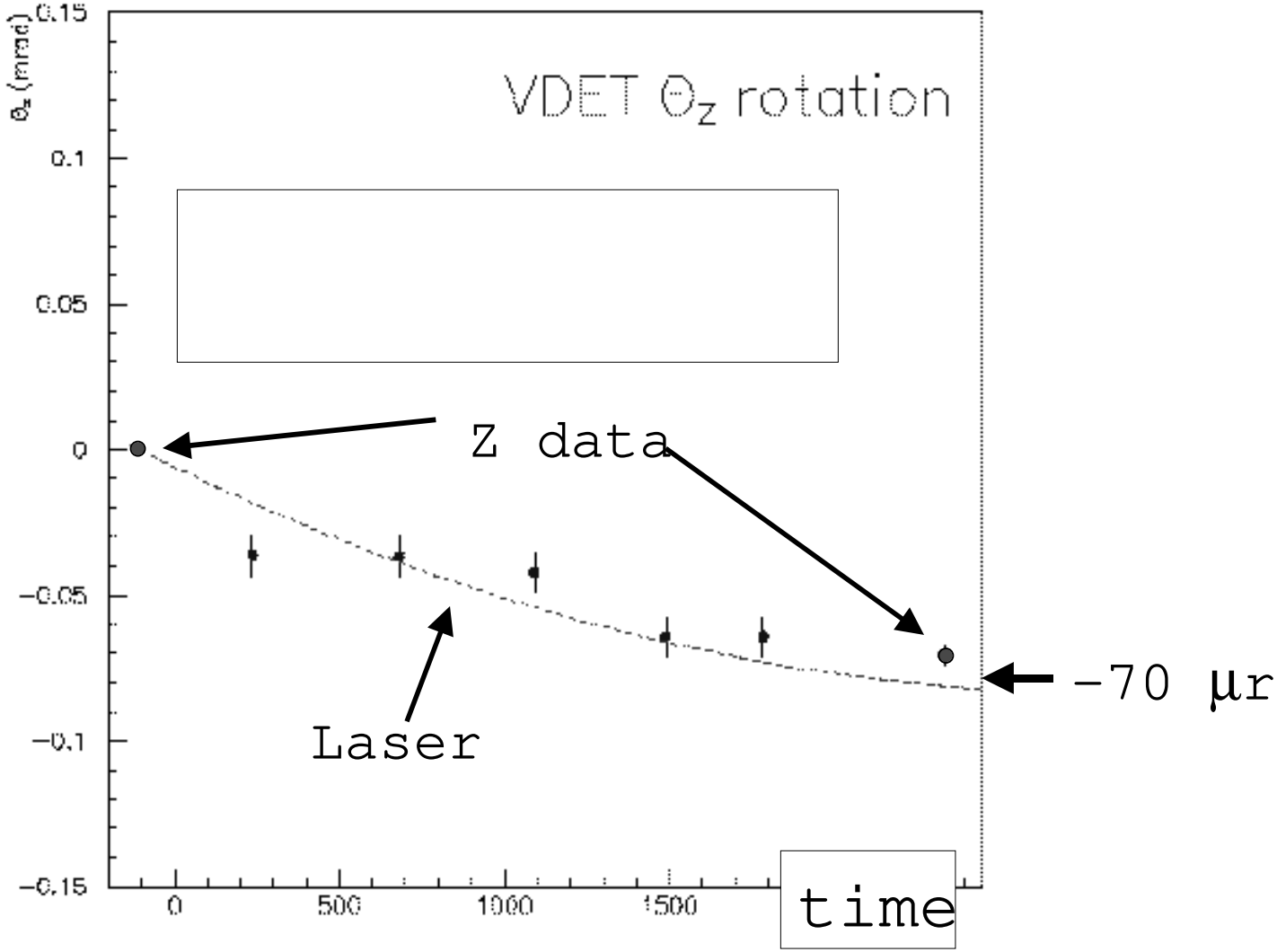
2 cm

VDET supports

Movement already observed last year, confirmed by this year data

VDET Rotation - 2

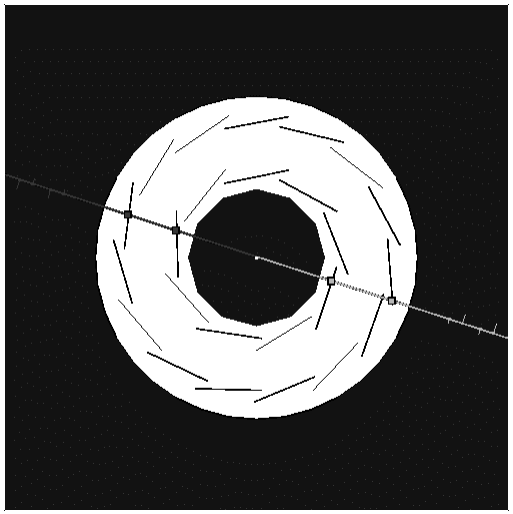
Rotation confirmed by 2nd Z run



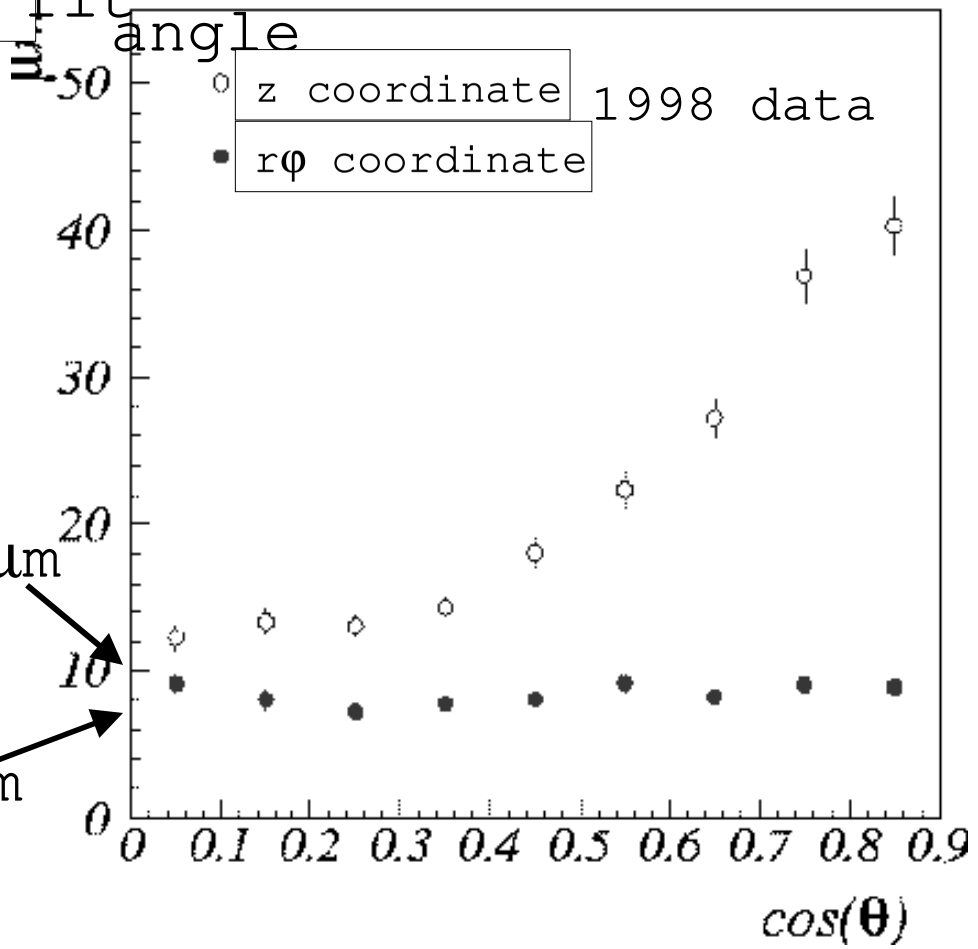
VDET hit resolution

Di-muon evts

Residuals to dimuon single fit



Hit resolution vs polar angle



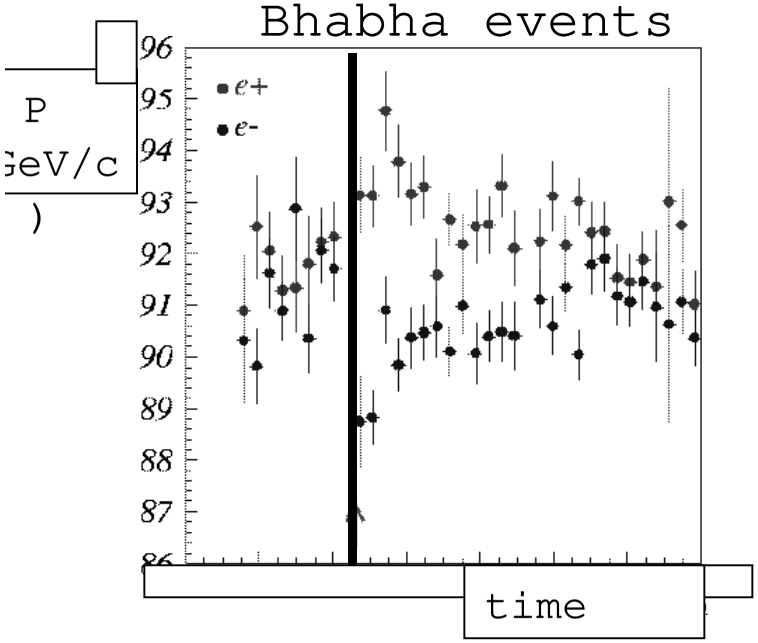
10 μm

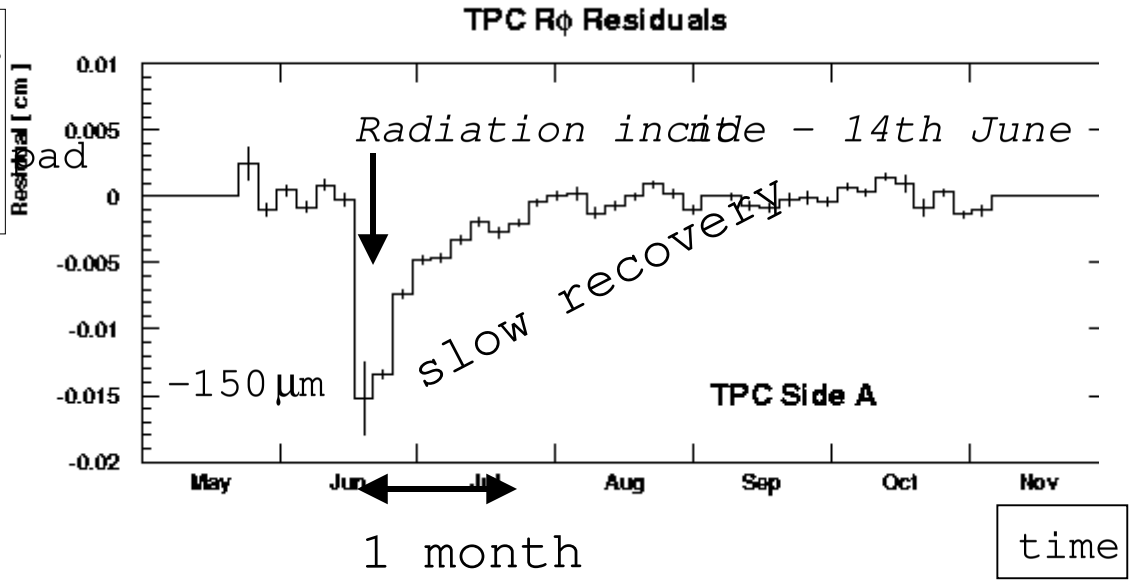
Expected resolutions at 90 deg.

8 μm

Radiation incident effec

Average residuals measured on the 9 (out of 21) inner rows

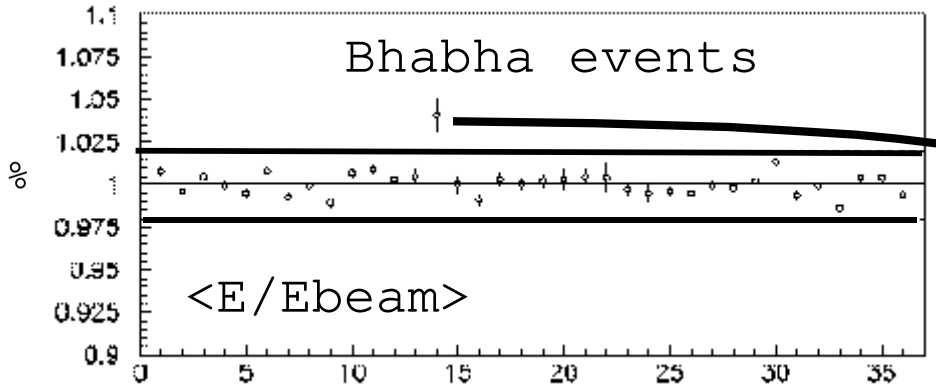




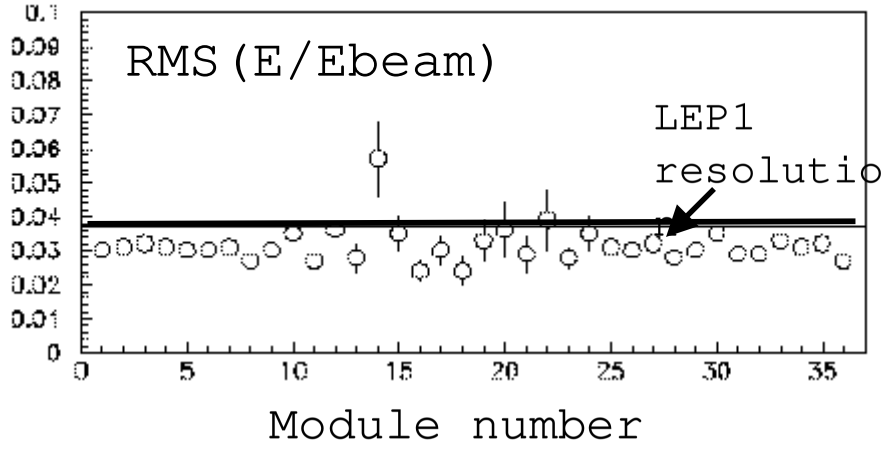
1 month
to recover

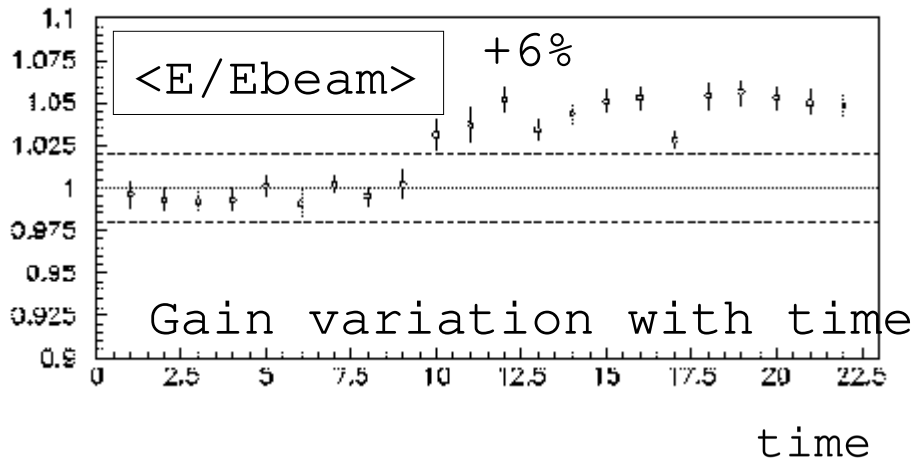
Taken care by the alignment
Recoverable by reprocessing of data

Electromagnetic calorimete



Gas leak in a pump
8th August





Recoverable by reprocessing of

189 GeV data
Preliminary results
from all collected luminos

189 GeV data - 1

- LARGE amount of integrated luminosity collected, systematics have to be carefully studied (take time)
  - <2 % statistical precision expected on σ_{WW}
  - 1 per mil on M_W

- End of data taking one week ago
  - data quality is good
  - reprocessing of '98 data will start on Nov. 16th

189 GeV data - 2

- 4-fermion final state analyses (WW,Higg are complicated due for example to the increase in the ZZ process cross-sectio

- Need to understand the different 4f Mon Carlos(even if they tend to agree at the cros section level)

189 GeV data - 3

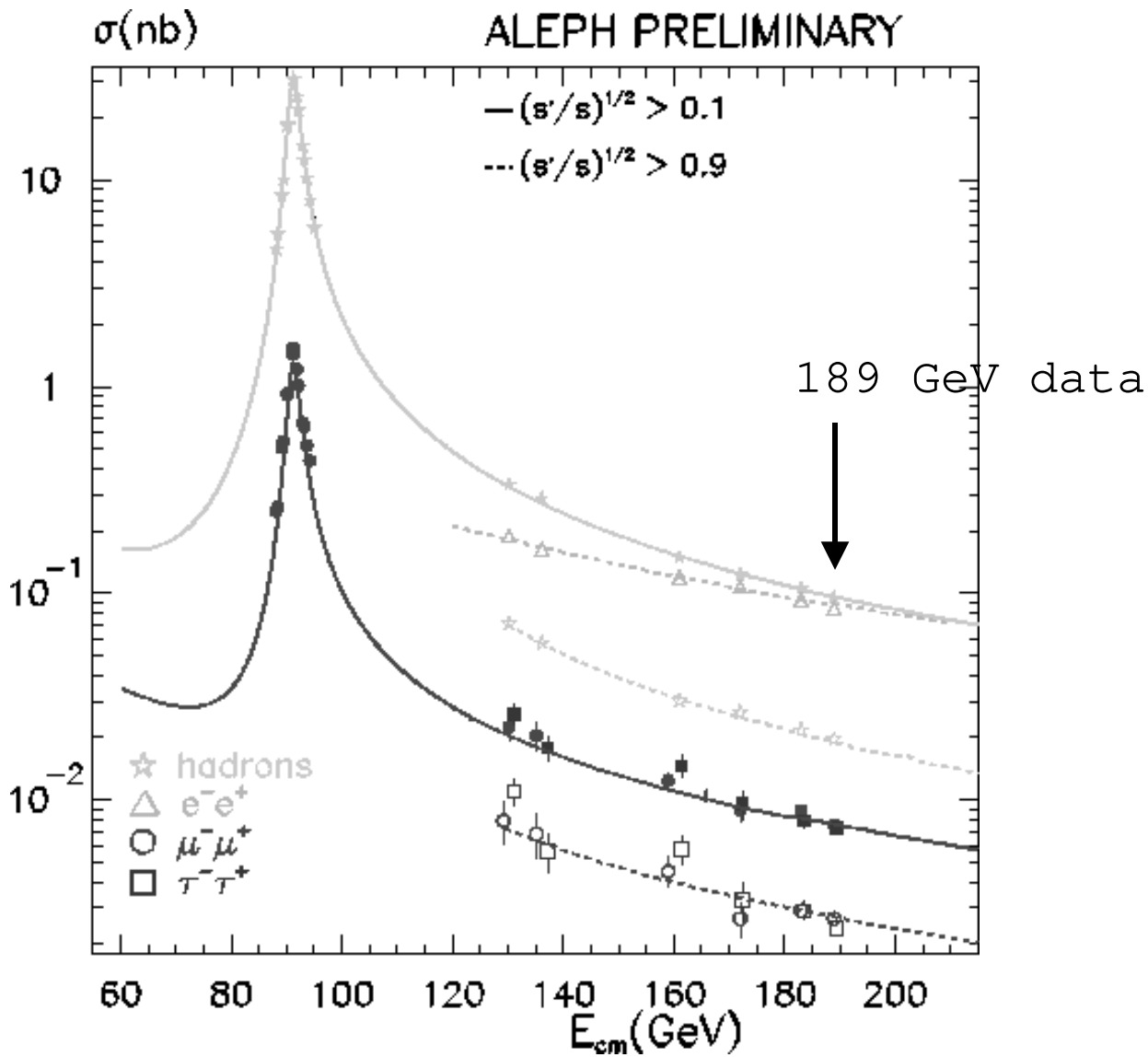
- Preliminary physics results only for to which do not require precise
  - evaluation of systematics
  - background subtraction

- No results on
  - WW cross section, W mass
  - Higgs (SM, MSSM)

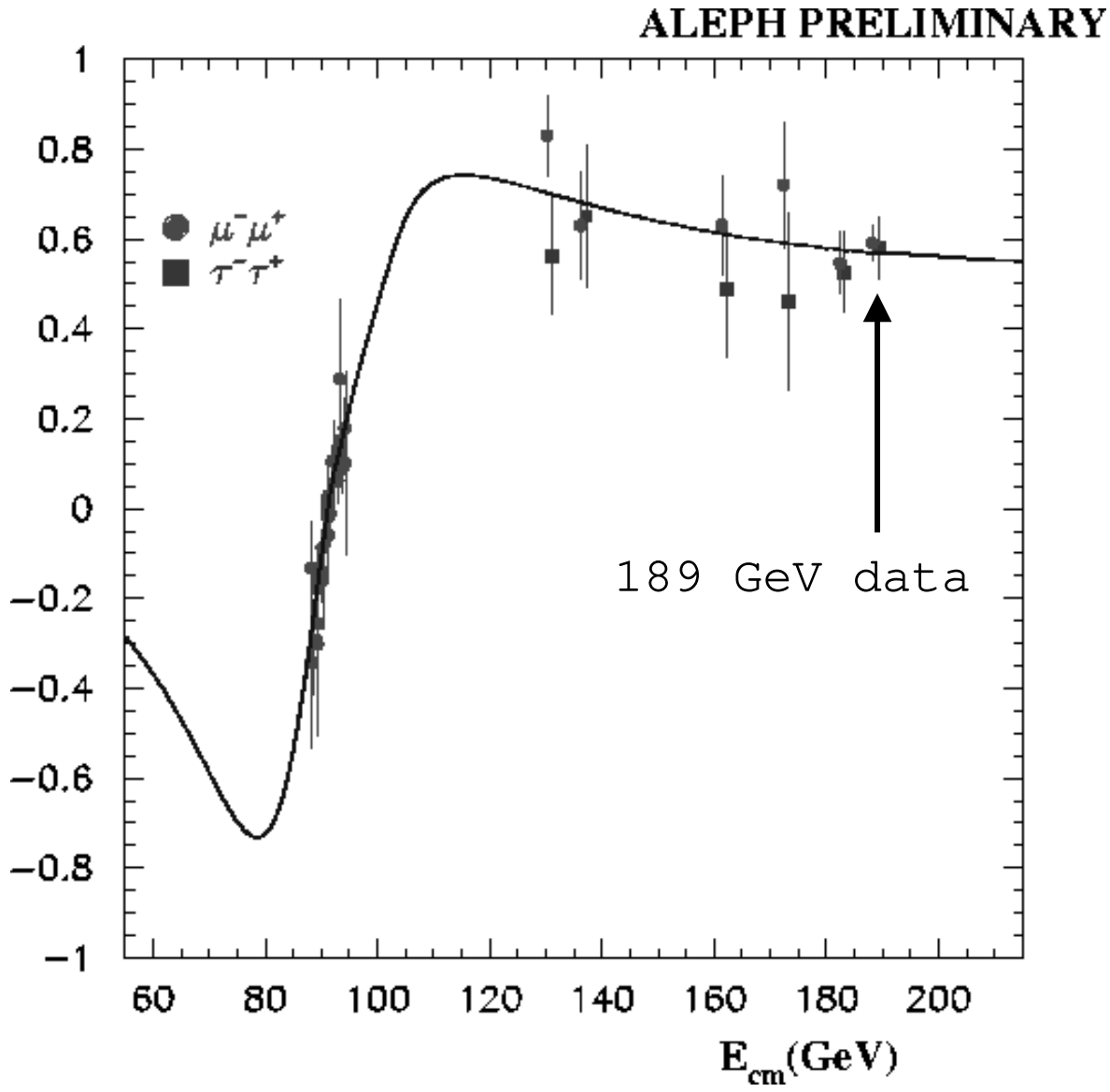
...yet

2-fermions

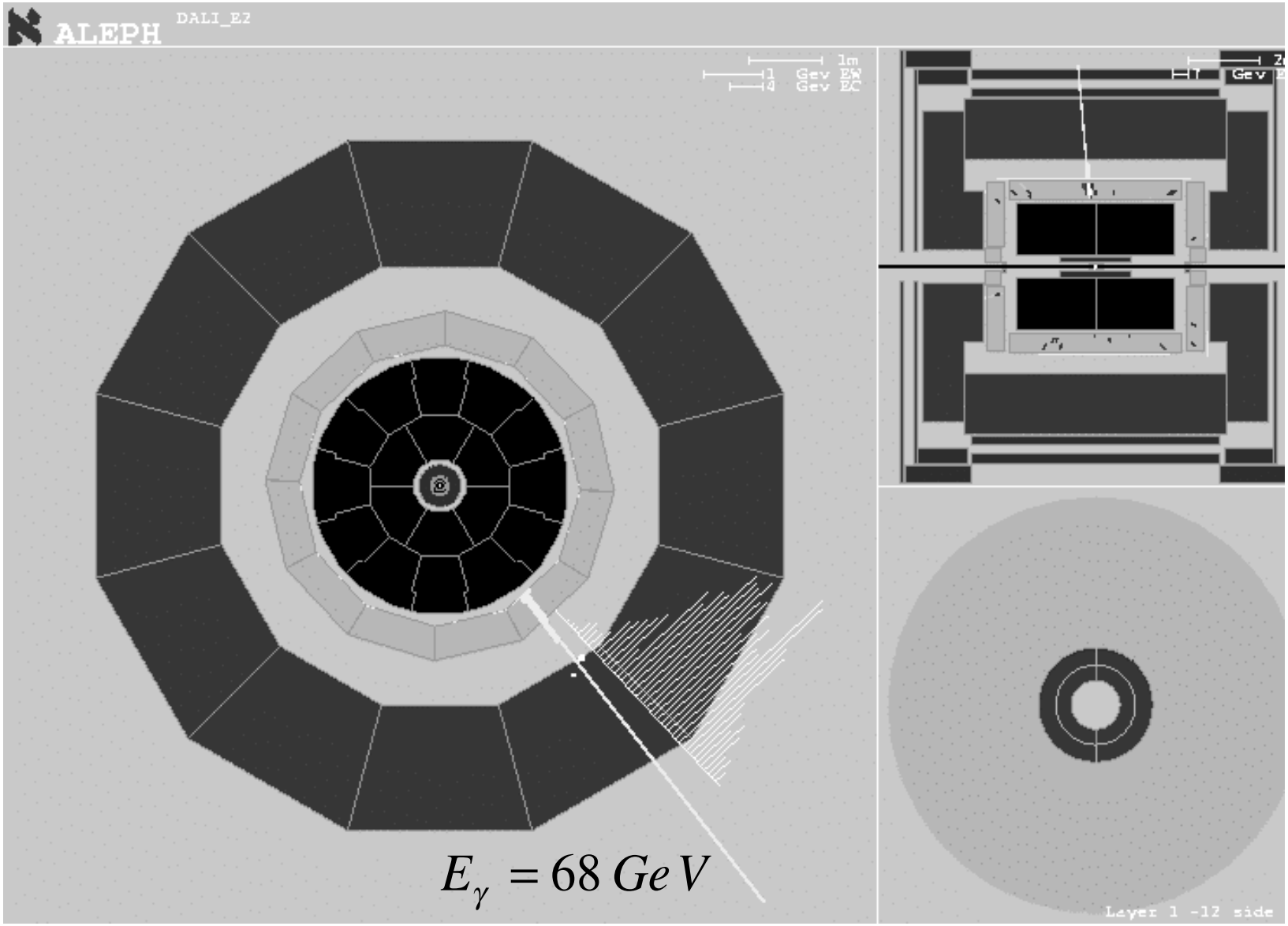
2-fermion cross-section



2-fermion asymmetries

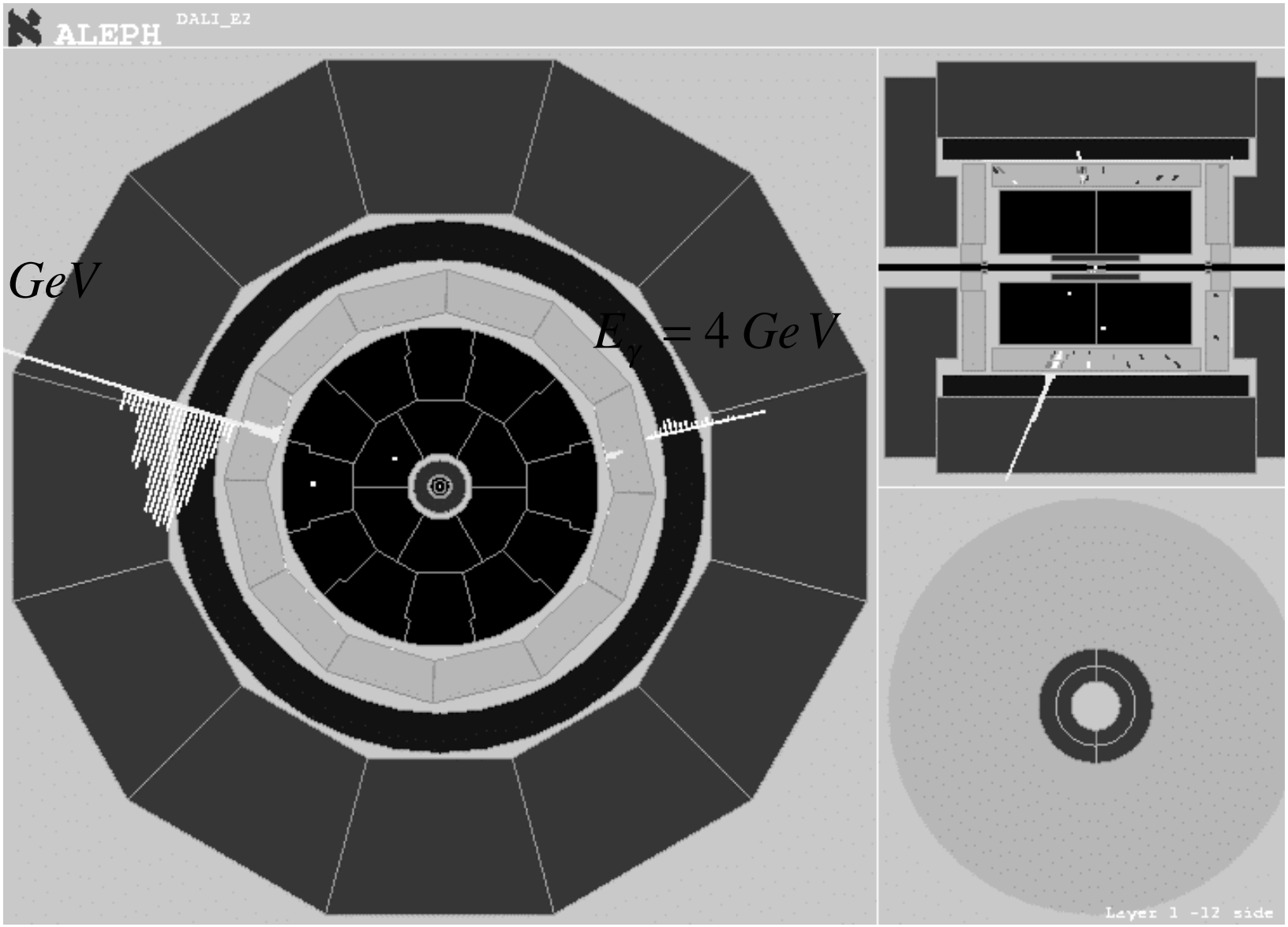


Single γ event



$$E_\gamma = 68\,GeV$$

$2-\gamma$ event



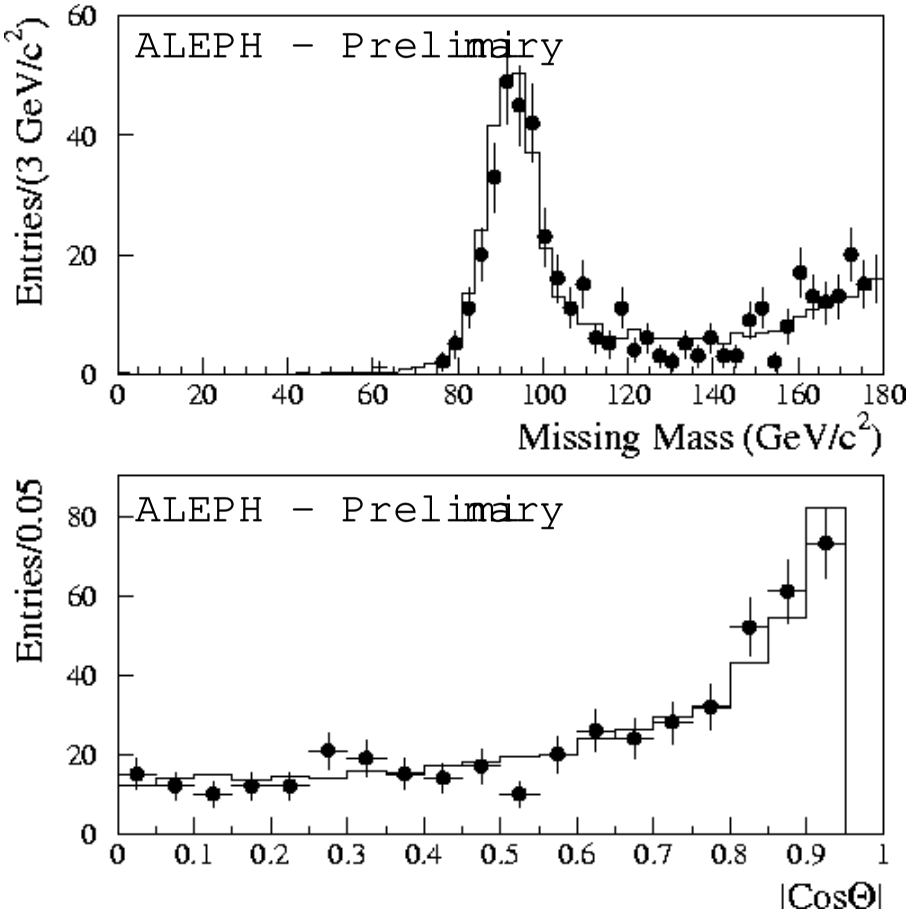
$= 50\ GeV$

photon events

KORALZ

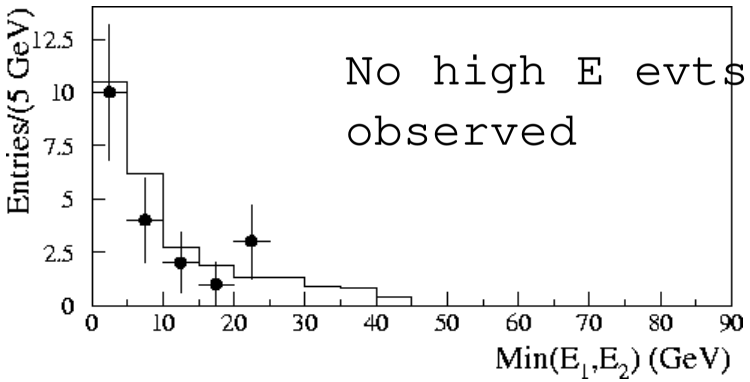
	# expected events	# observed events
1 γ	480	473
2 γ	25	18
3 γ	.7	2

Single-photon events



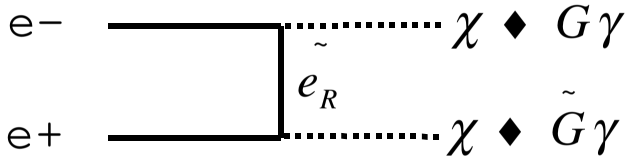
2-photon events

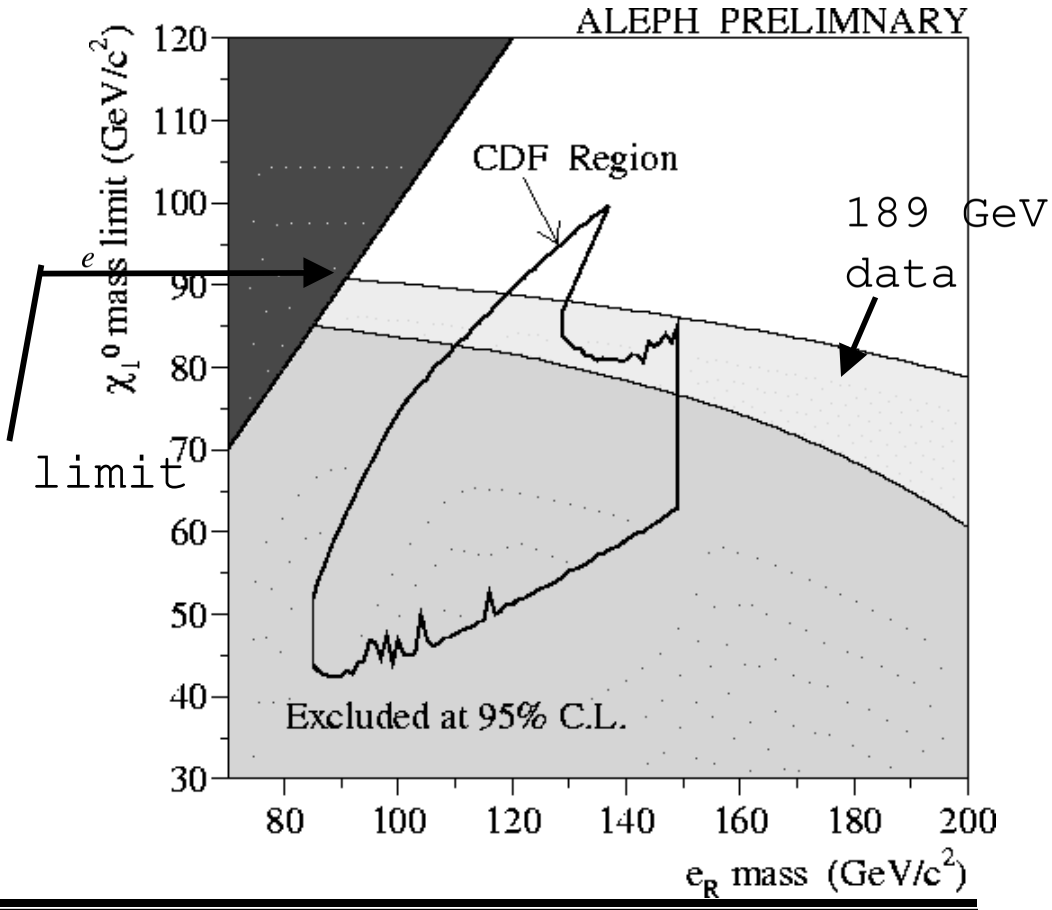
Minimum γ energy in acoplanar-γ pairs events



No high E evts observed

GMSB interpretation

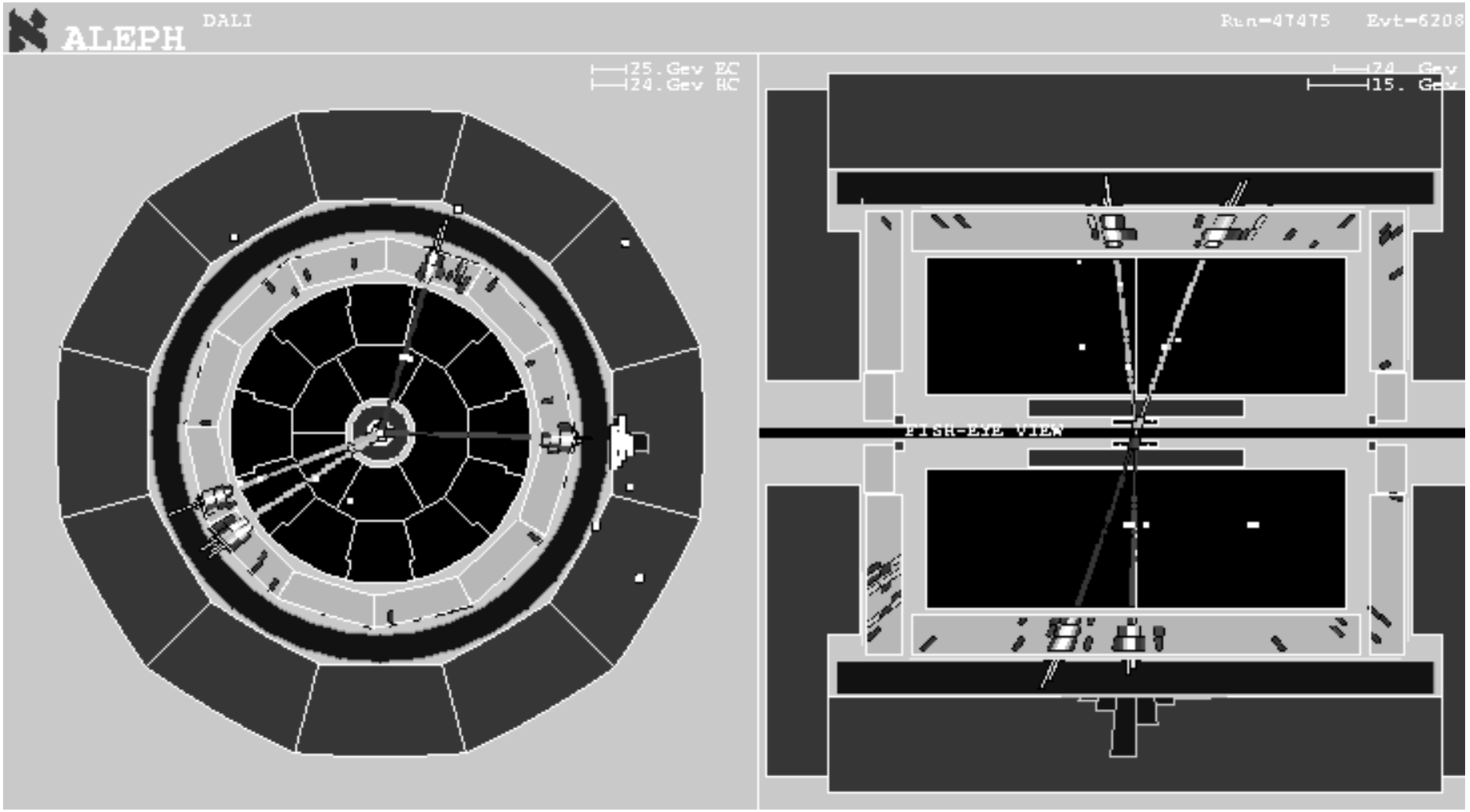




e Kinematical limit

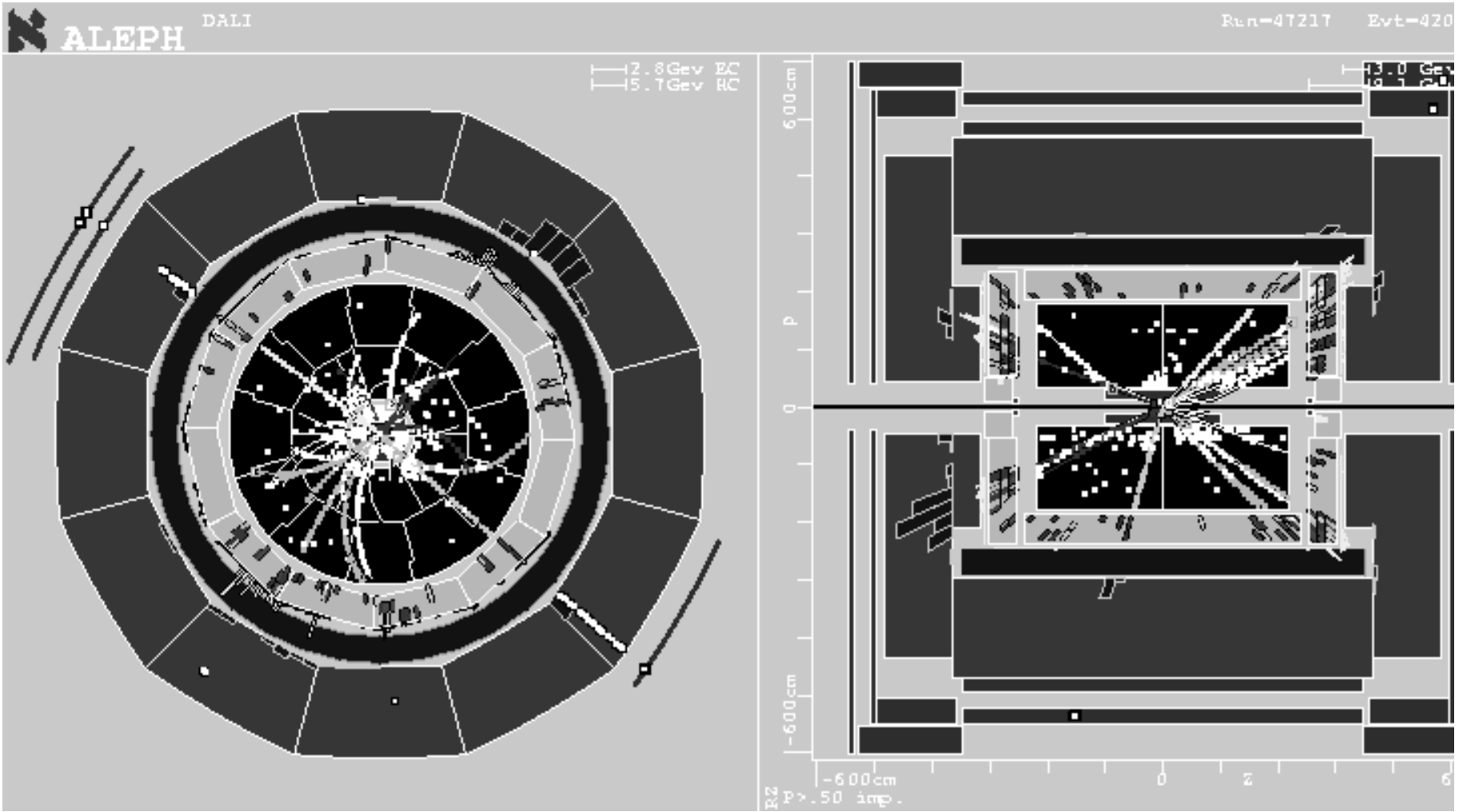
ZZ and WW

$e^+e^- \blacklozenge Z^0Z^0 \blacklozenge e^+e^-e^+e^-$



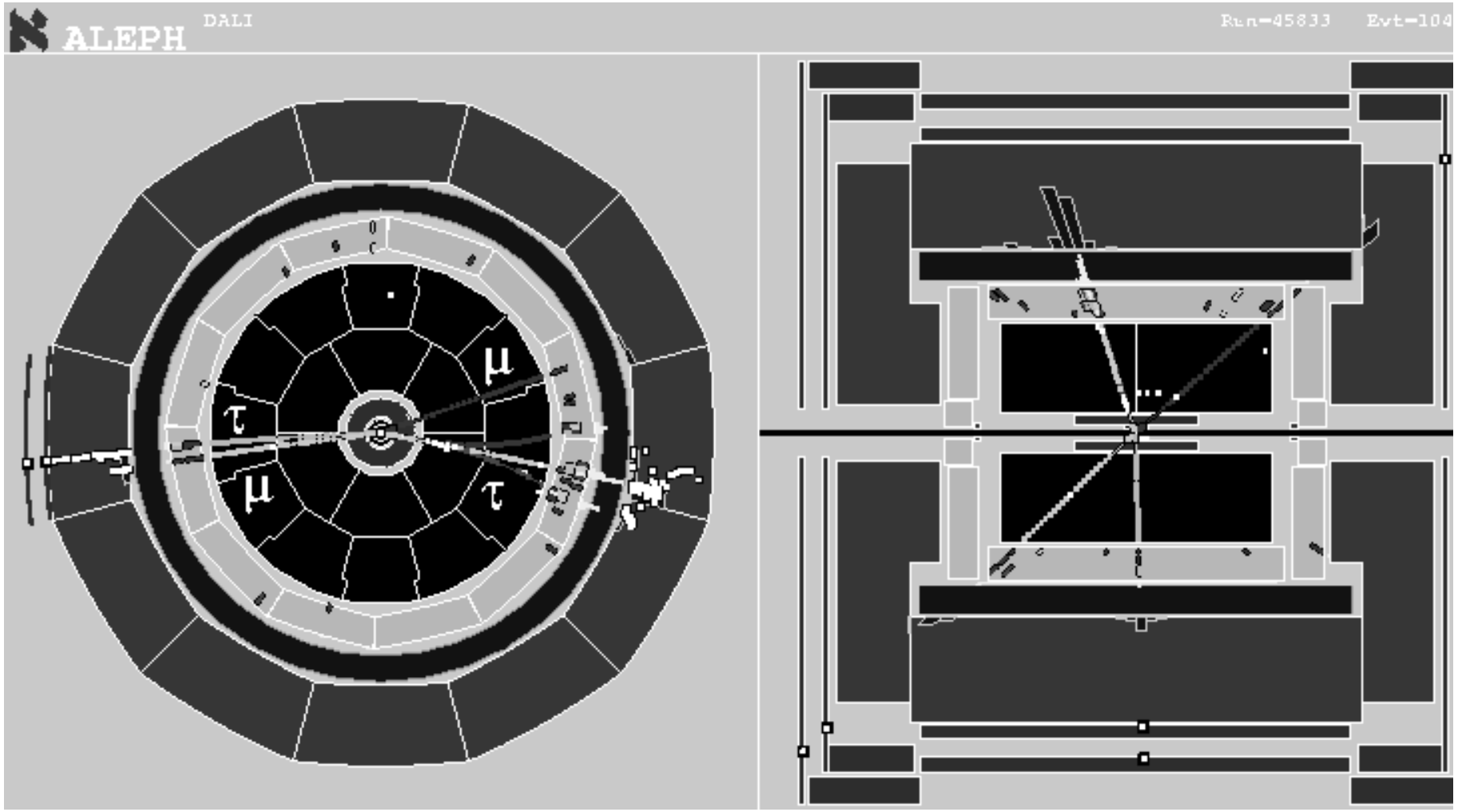
$$M^1_{e^+e^-} = 88.7\ GeV/c^2 \qquad M^2_{e^+e^-} = 90.2\ GeV/c^2$$

$e^+e^- \blacklozenge Z^0Z^0 \blacklozenge \mu^+\mu^- q\bar{q}$



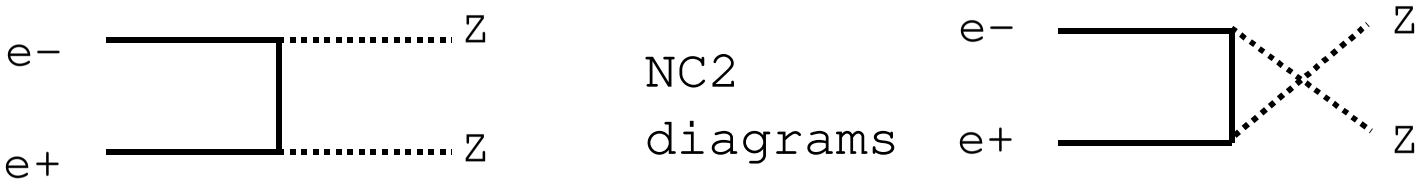
$$M_{\mu^+\mu^-} = 90.1\,GeV/c^2 \qquad M^{recoil}_{\mu^+\mu^-} = 91.1\,GeV/c^2$$

$e^+e^- \blacklozenge Z^0Z^0 \blacklozenge \mu^+\mu^-\tau^+\tau^-$



$$M_{\mu^+\mu^-} = 95.8\ GeV/c^2 \qquad M^{recoil}_{\mu^+\mu^-} = 90.2\ GeV/c^2$$

ZZ cross-section



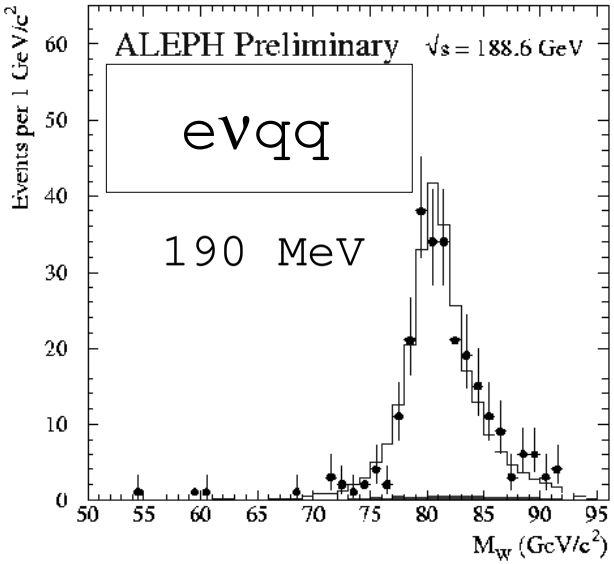
All visible channels analyzed

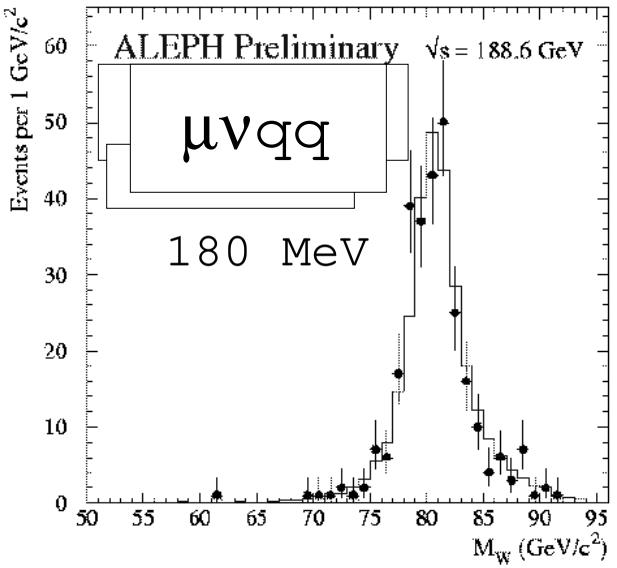
4q, llqq, $\nu\nu$qq, ll$\nu\nu$

$$\sigma_{NC2}^{ZZ}(189\,GeV) = 0.57 \pm 0.12\,(stat.)\ pb$$

SM: 0.67 pb

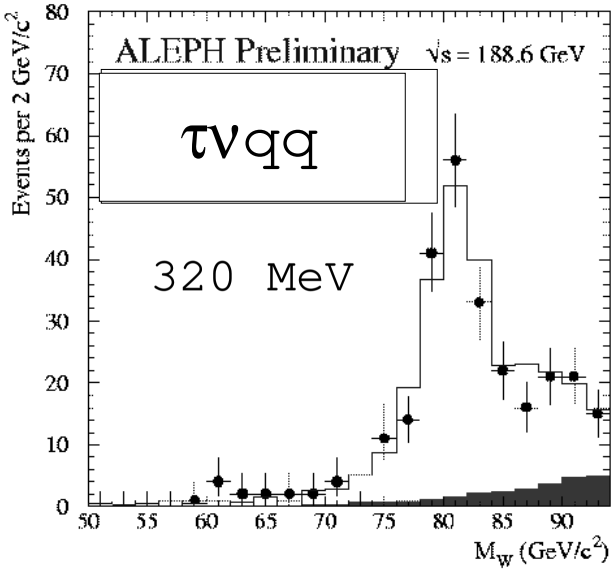
W mass

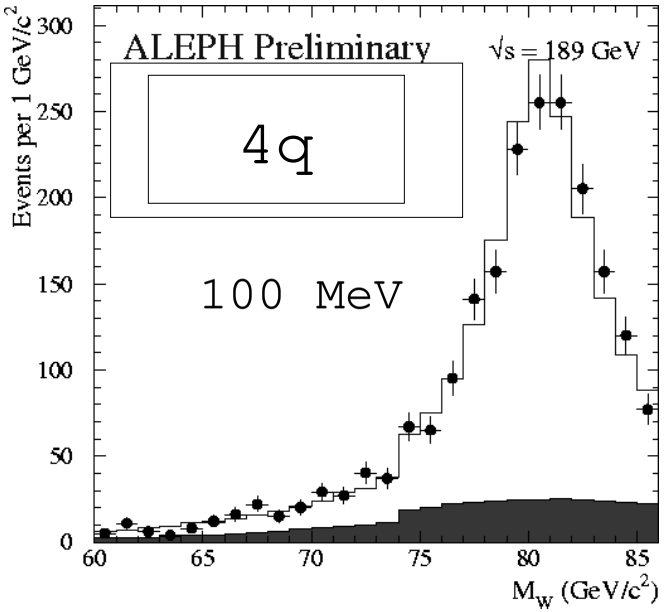




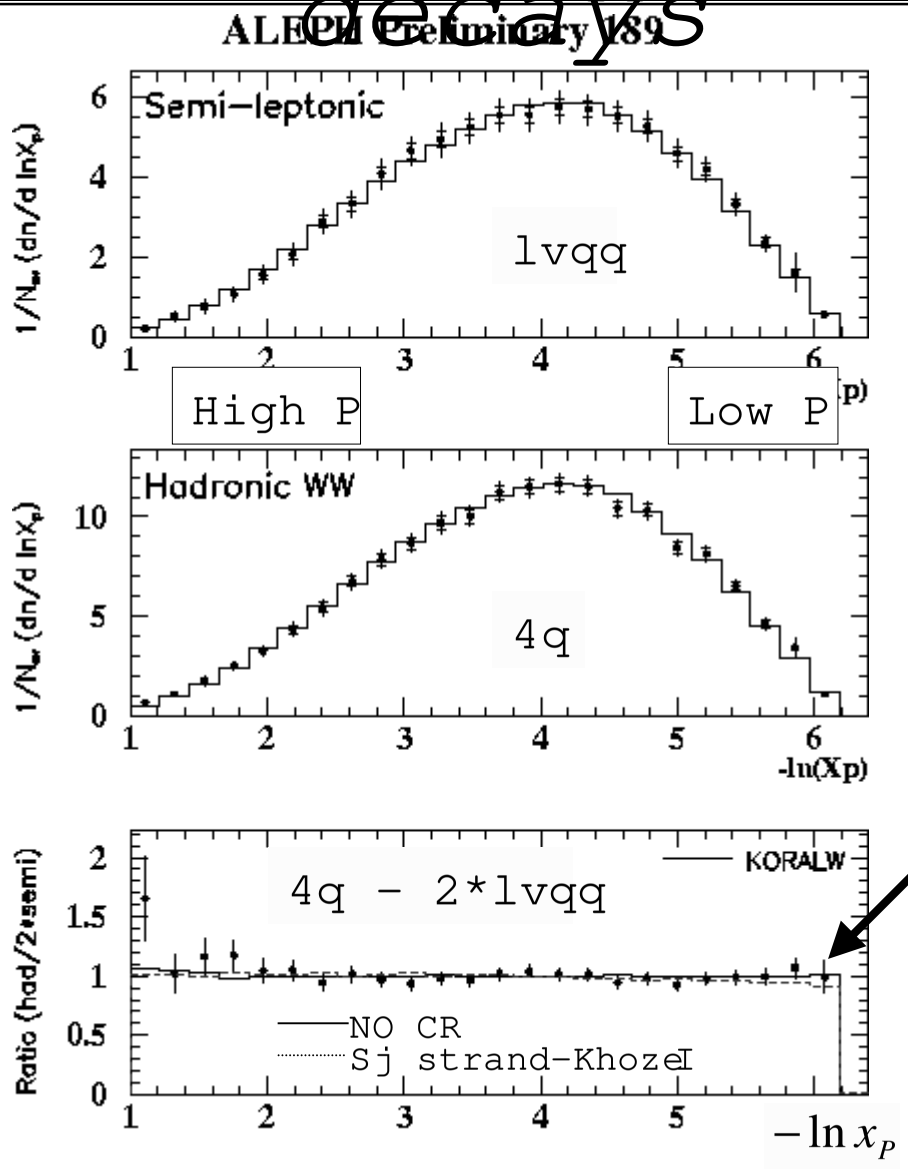
Expected statistical errors

80 MeV combined





Charged P distribution in decays



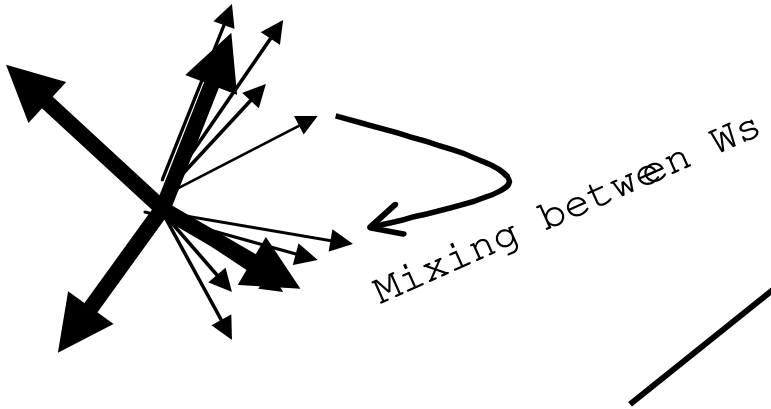
Where Color reconnection is expected t show up

Bose-Einstein correlation

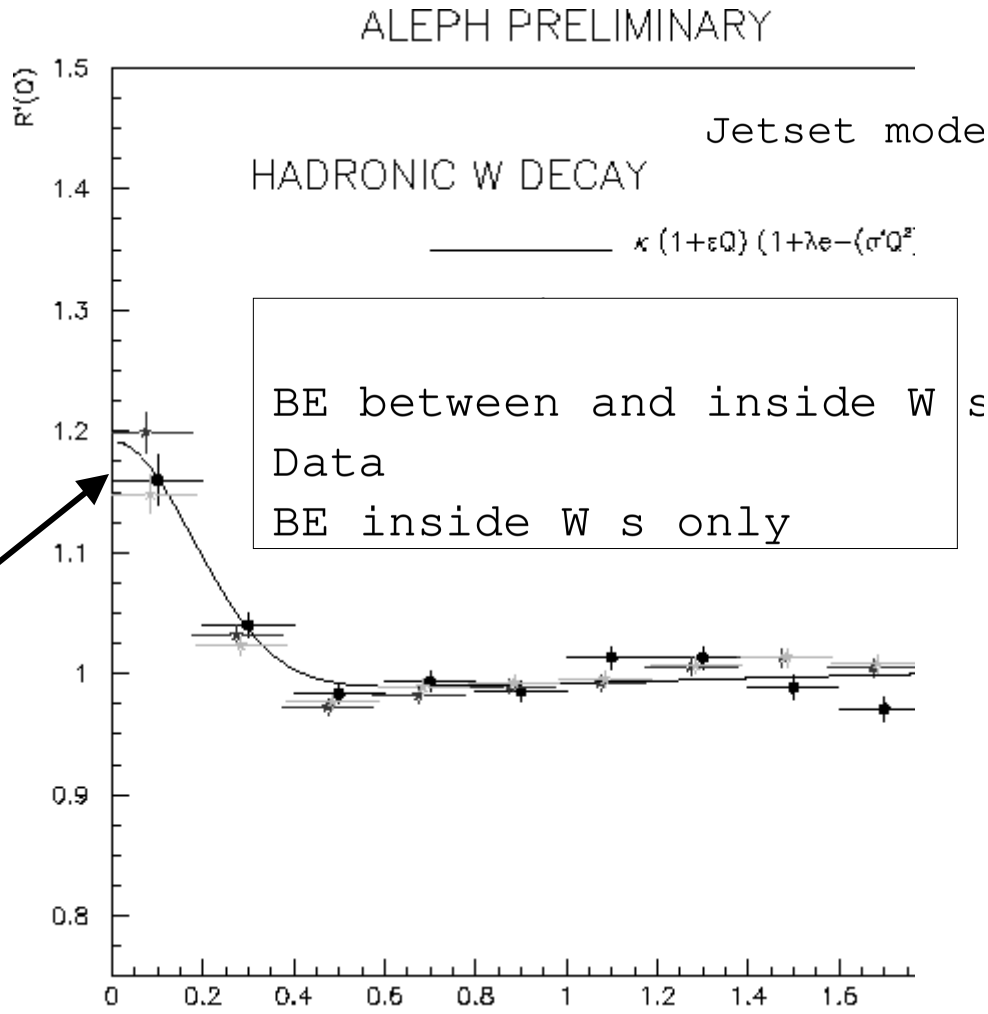
Correlation between same sign pions

¥BE between Ws?

¥Systematic on mass?



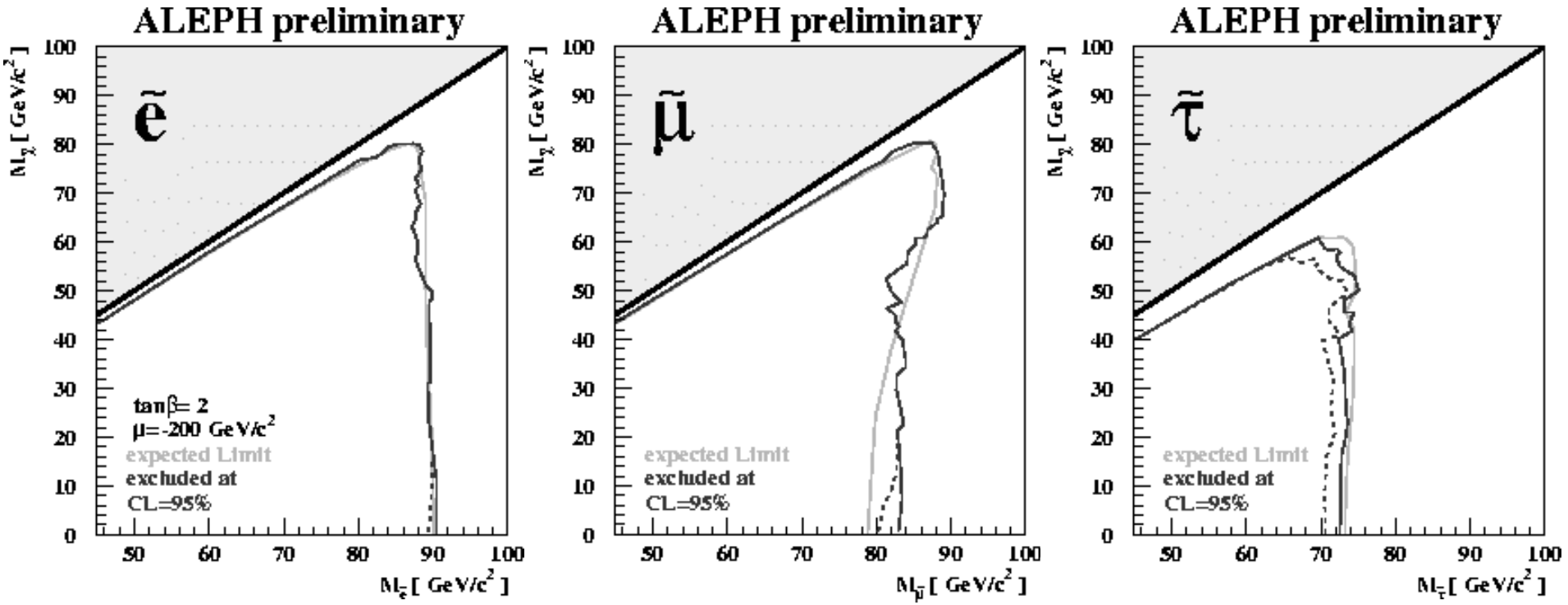
Statistical error becomes interesting



SUSY searches

Sleptons

Channel	# expected events	# observed events	Limit (GeV) At $M_\chi = 0$	Improvement (GeV)
ee	33.7	34	90	~4
$\mu\mu$	30.6	27	83	~8
$\tau\tau$	17.1	21	73	~2

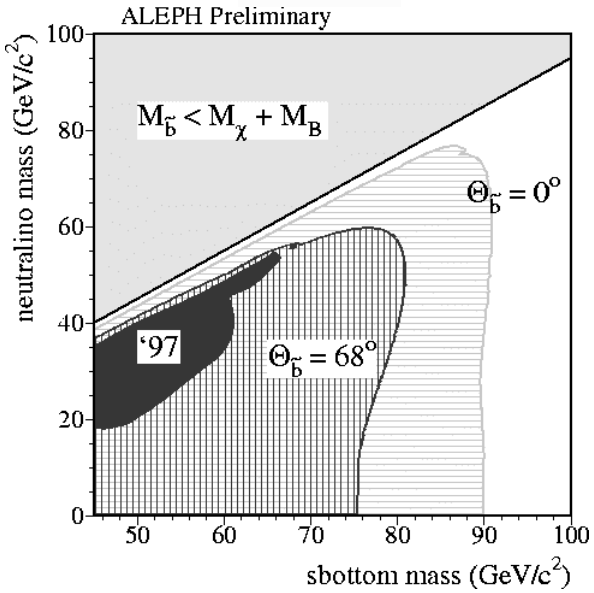


Squarks

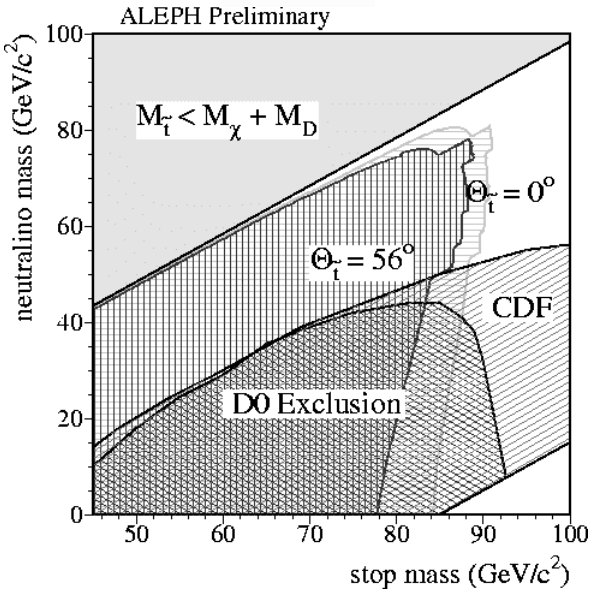
Channel	Expt. Events	Obsv. Events	Improvement (GeV)
$t \to c\chi$	7.9	7	~8
$b \to b\chi$	0.7	0	~10
$t \to bl\nu$	2.2	1	~6

Mass limits around 90 GeV for m_χ=0 and mixing angle ⌐

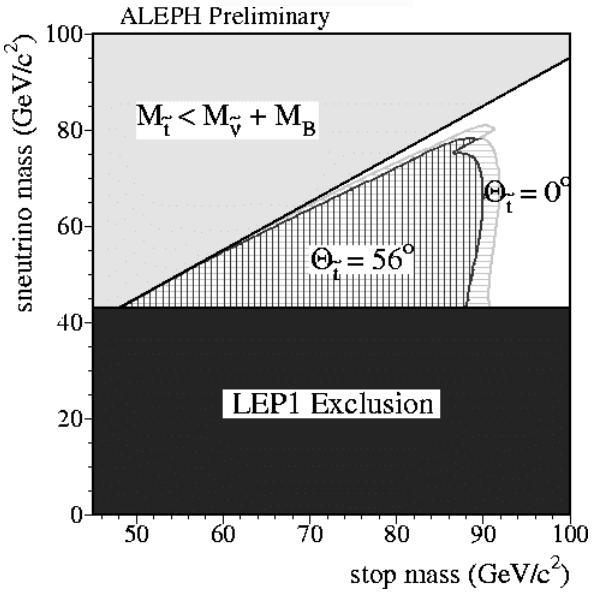
$\tilde{b} \to b\chi$



$\tilde{t} \to c\chi$



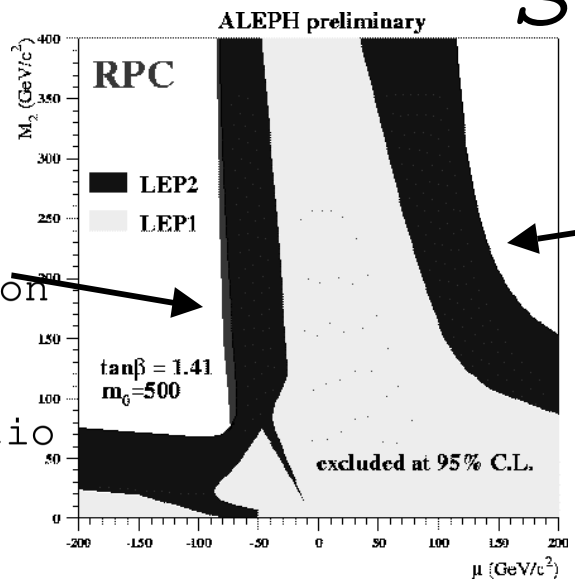
$\tilde{t} \to bl\tilde{\upsilon}$



Chargino/neutralino searches

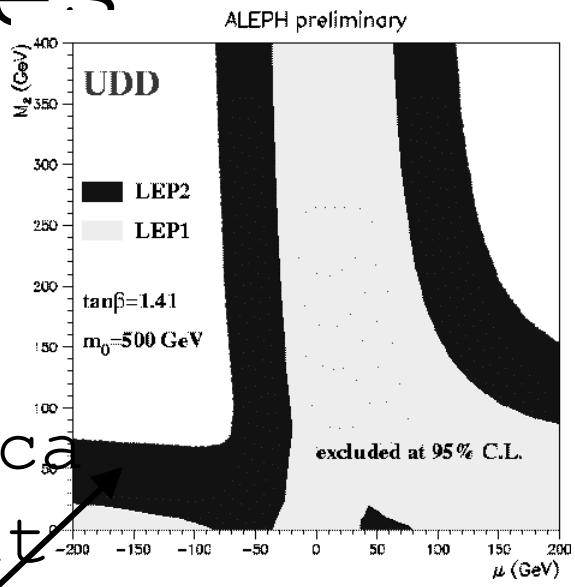
utralino
ntribution

hargino
ontributio
l

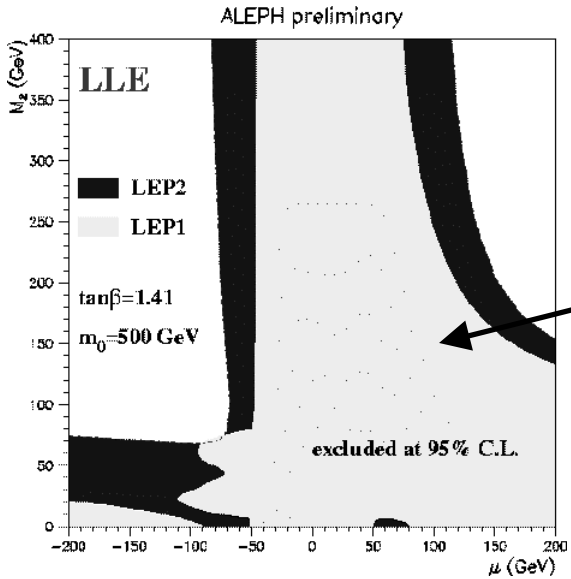


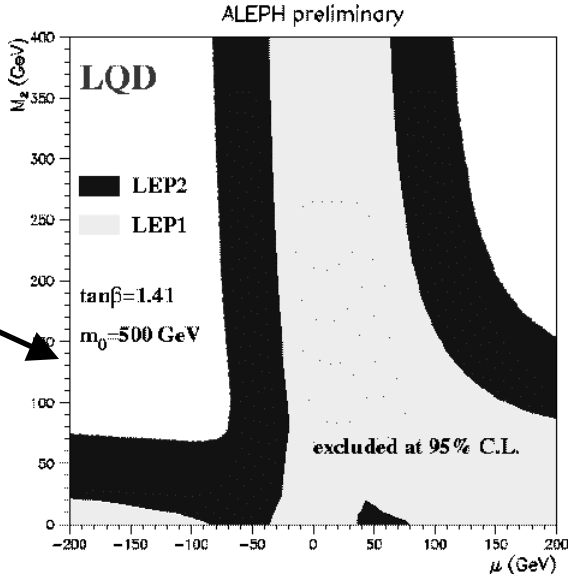
R-parity conserved

At kinematical limit



R-parity violated



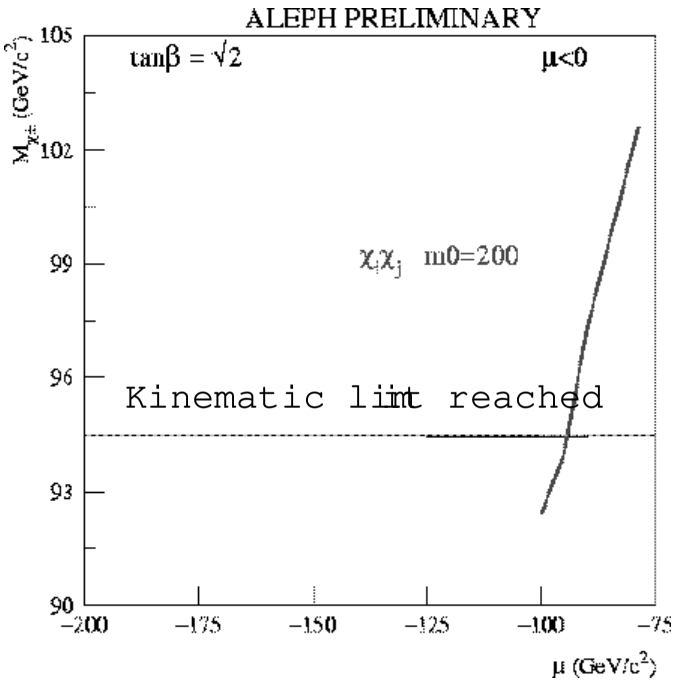


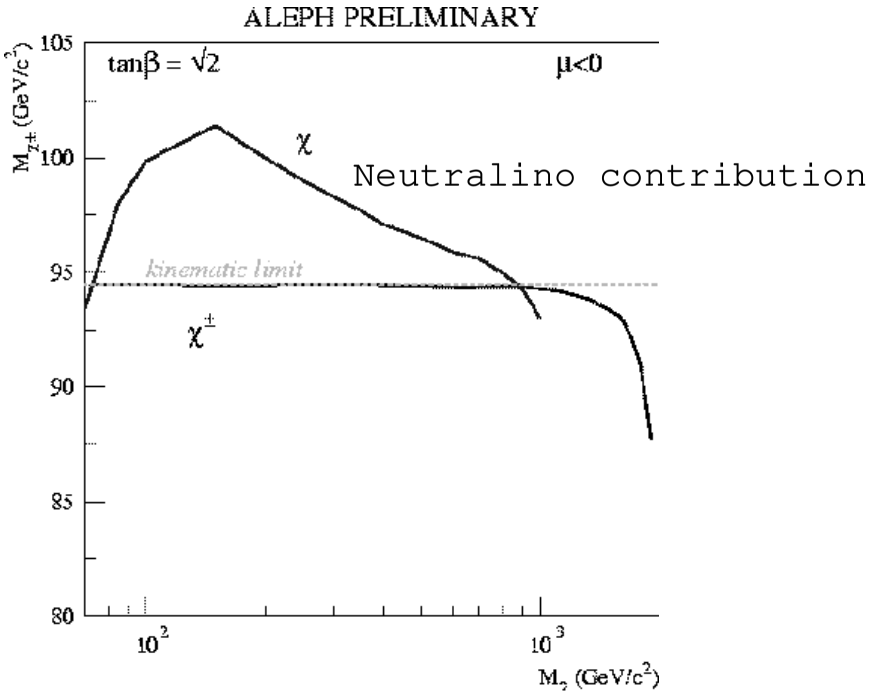
Chargino mass limit

Channel	# exp. Events	# obsv. Events
$\chi\chi'$	1.6	1
$\chi^+\chi^-$	5.5	7

Gaugino region

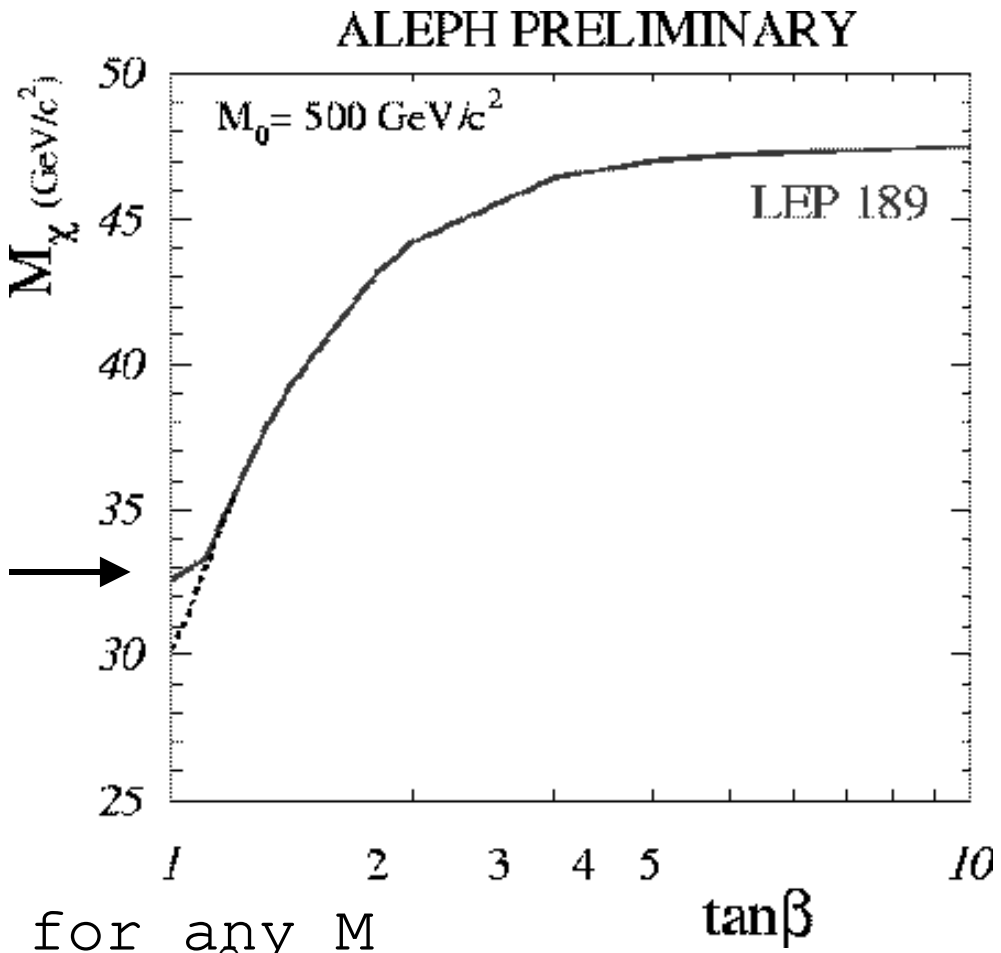
Higgsino region





lsp mass limit

lightest supersymmetric partern mass limit



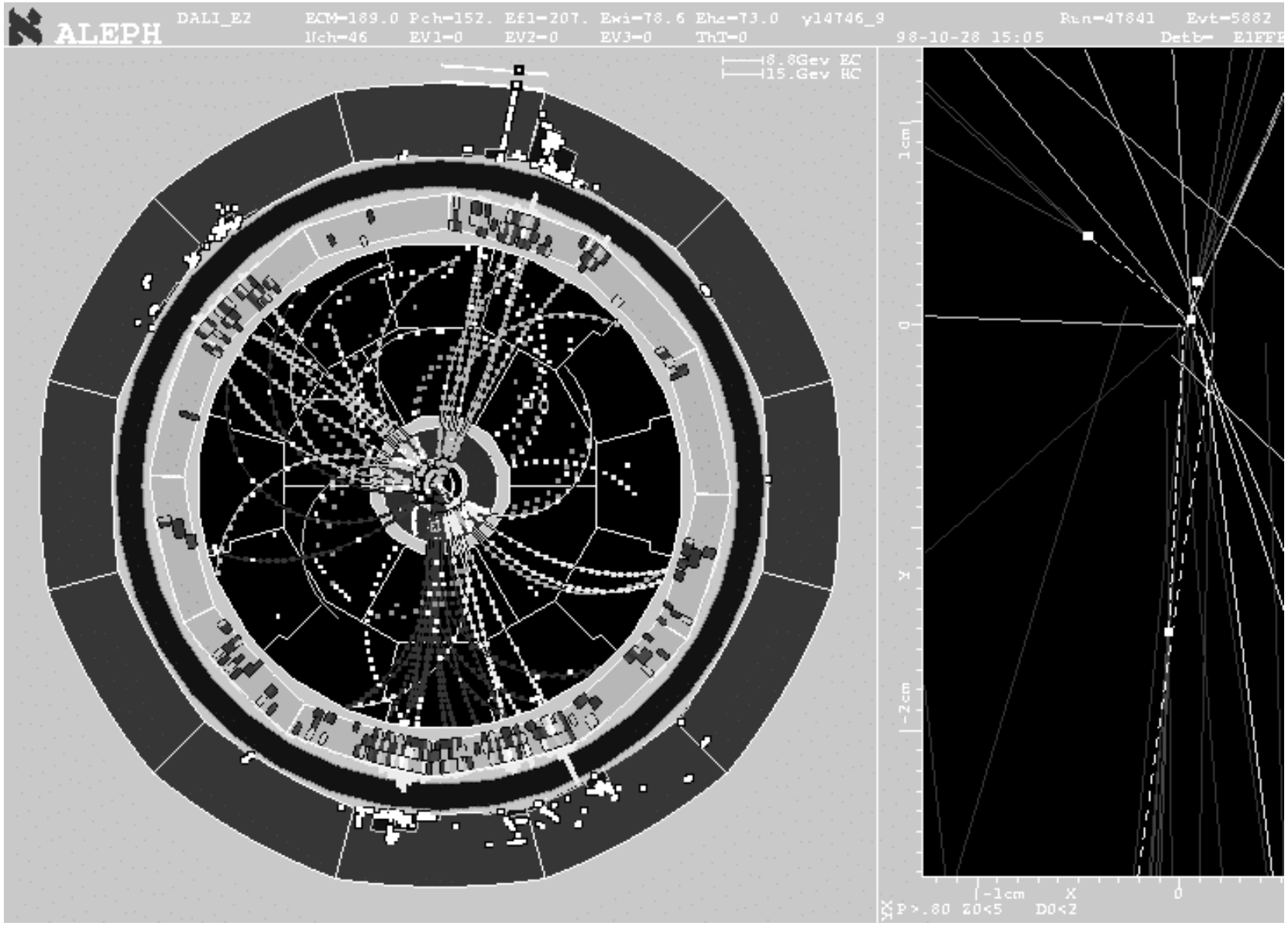
32.6 GeV for large M_o

Absolute limit for any M_o and tanβ should be between 27 and 32.6 GeV

Higgs

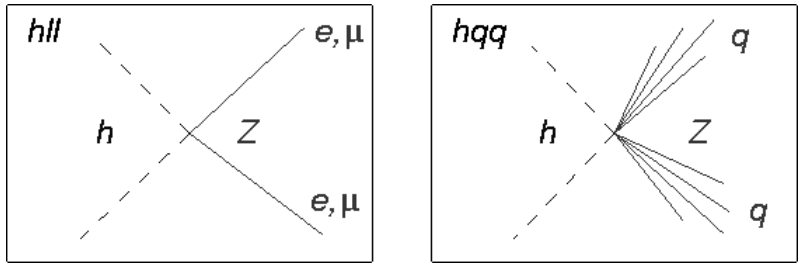
We have some nice events

4b event


ALEPH
DALI_E2
ECM=189.0 Pch=152. Efl=207. Ewi=78.6 Ehc=73.0 y14746_9
Nch=46 EV1=0 EV2=0 EV3=0 ThT=0
Run=47841 Evt=5882
98-10-28 15:05
8.8Gev EC
15.Gev HC
1cm
0
-2cm
-1cm X 0
P>.80 Z0<5 D0<2

Invisible Higgs decays

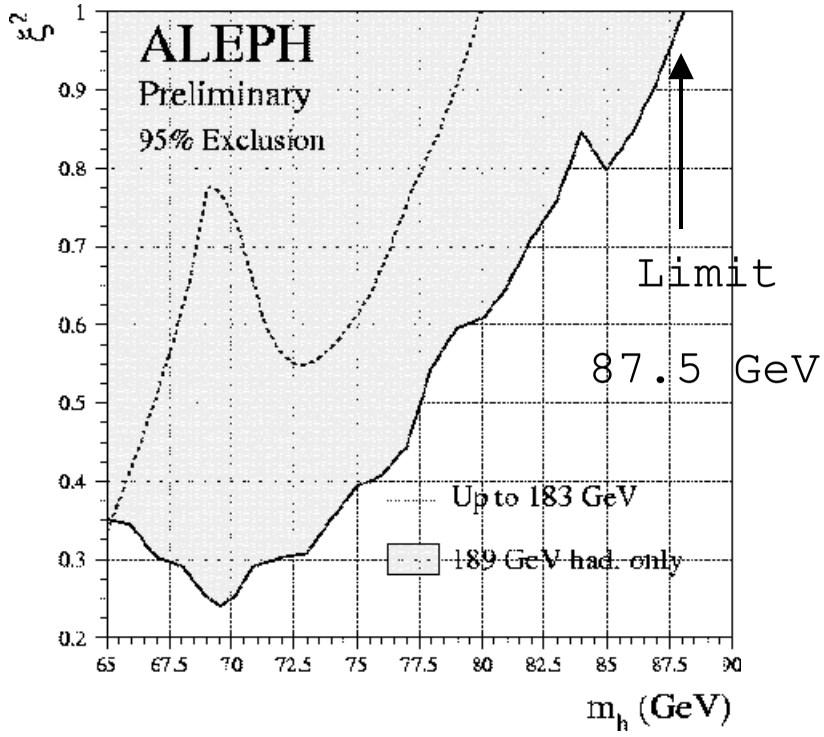
$e^+e^- \to hZ$

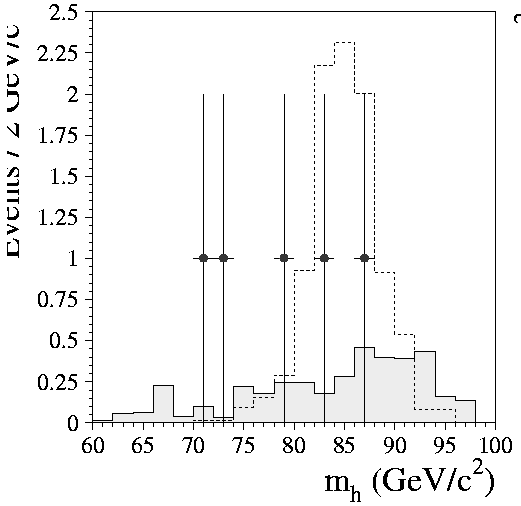


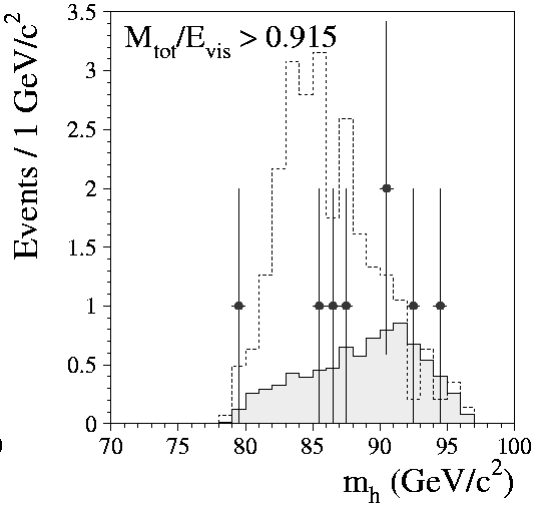
Acoplanar leptons with mass ~ M_Z

Acoplanar jets with mass ~ M_Z

$\sigma((h \to inv.)Z) = \xi^2 \cdot \sigma(HZ)_{SM}$



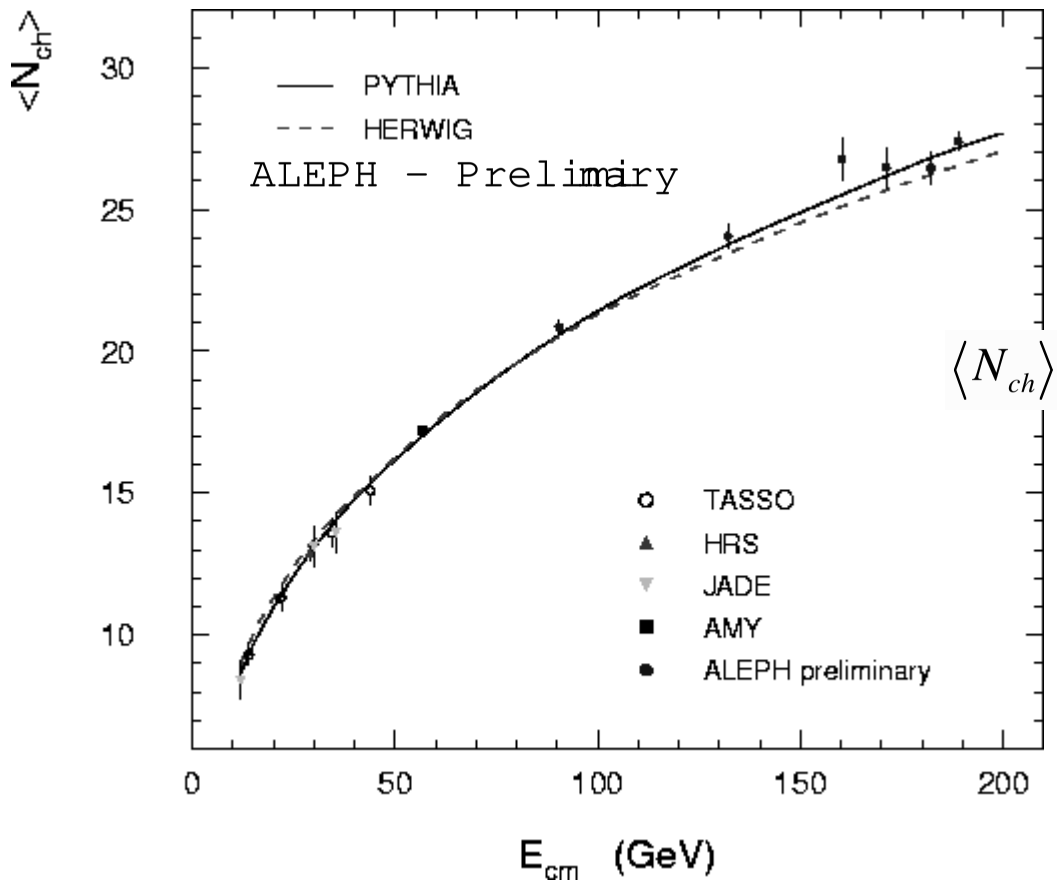




	Hll	Hqq
Expected bacground	3.8	8.8
Observed events	5	8

QCD studies

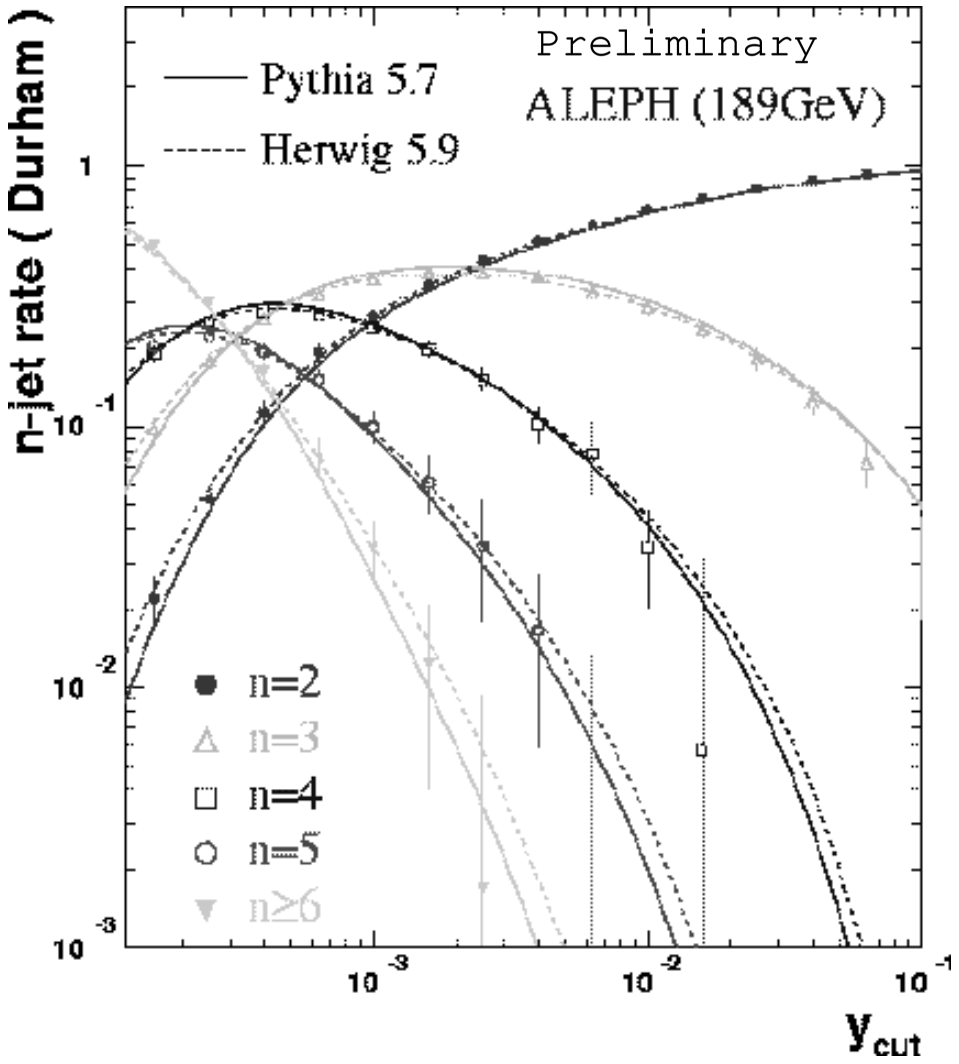
Charged multiplicity



189 GeV

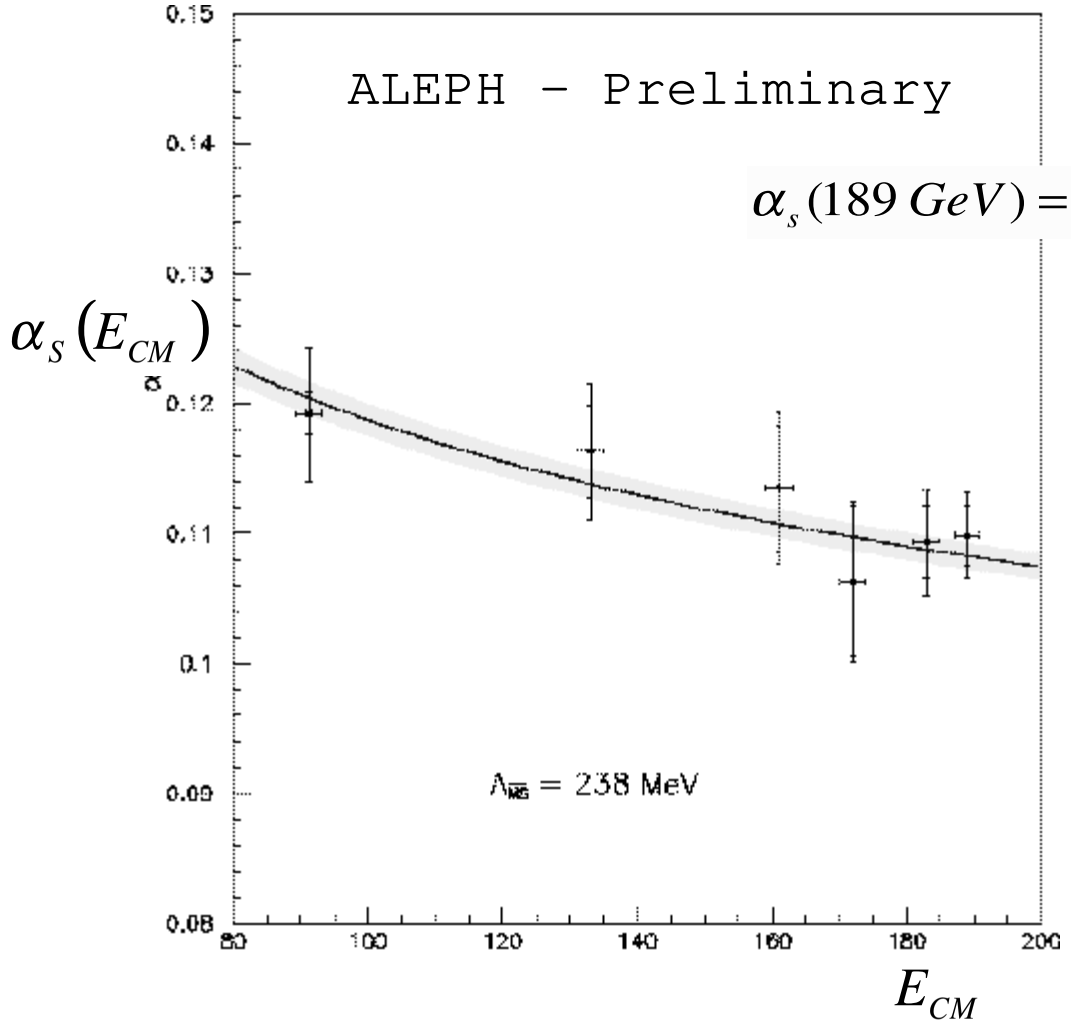
$$\langle N_{ch} \rangle = 27.37 \pm 0.20\ (stat.) \pm 0.27\ (syst.)$$

Jet rates



4-jet rate OK

α_s



189 GeV

$$\alpha_s(189\,GeV) = 0.110 \pm 0.001(stat.) \pm 0.003(syst.$$

Conclusions

- Congratulations to LEP for the luminosity delivered in 1998

- Efficient ALEPH running with good quality data

- Reprocessing of 98 data starts next week → winter conferences

- Waiting for the high luminosity provided by LEP at the highest energy →

1999 running

- Z runs (2 and 1 pb^{-1} preferably) at beginning and end of year
  - Z runs showed to be essential for systematic studies
- ALEPH accepts the number of energy steps deeme necessary for the most efficient operation as energy increases
- Over all energies taken in we hope for an integrated luminosity similar or better than t year