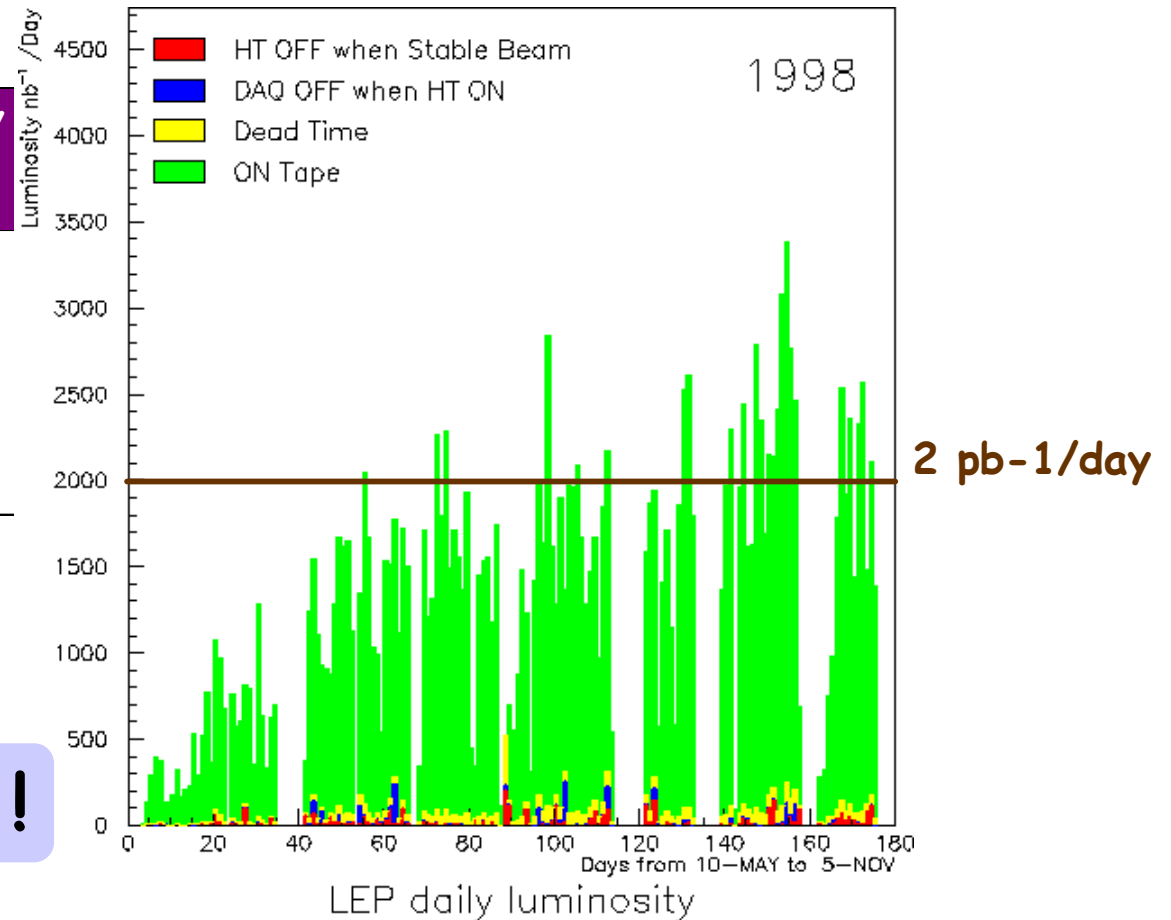

ALEPH Status Report

Eric Lançon
CERN and CEA-Saclay

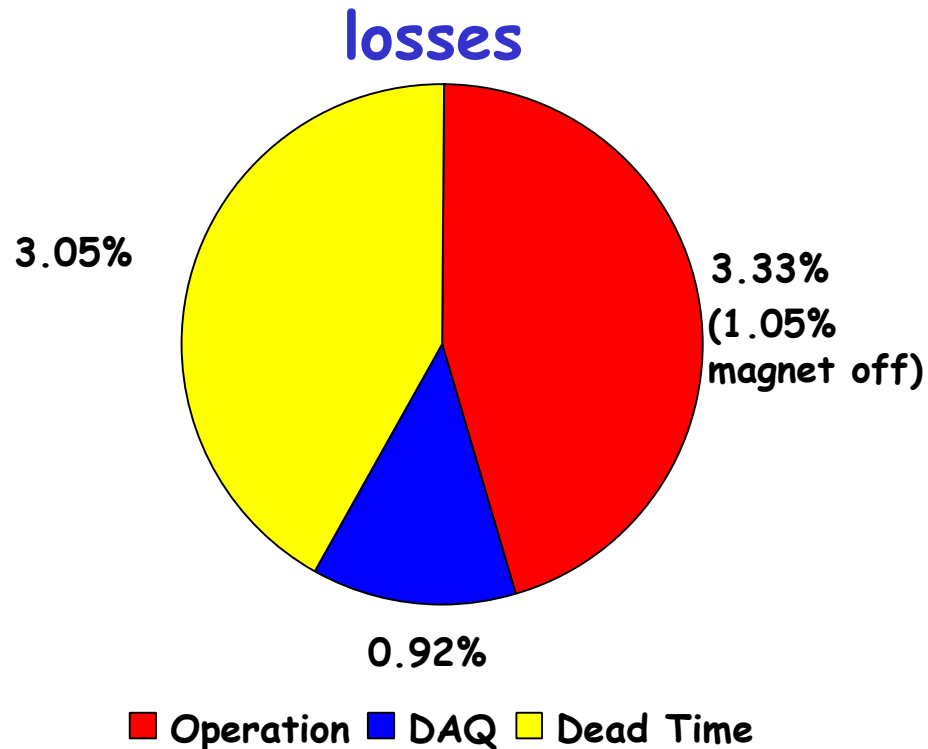
Integrated luminosity

	Delivered (pb^{-1})	On Tape (pb^{-1})	Efficiency
Z^0	3.3	3.1	95.0%
189 GeV	192.7	179.4	93.1%

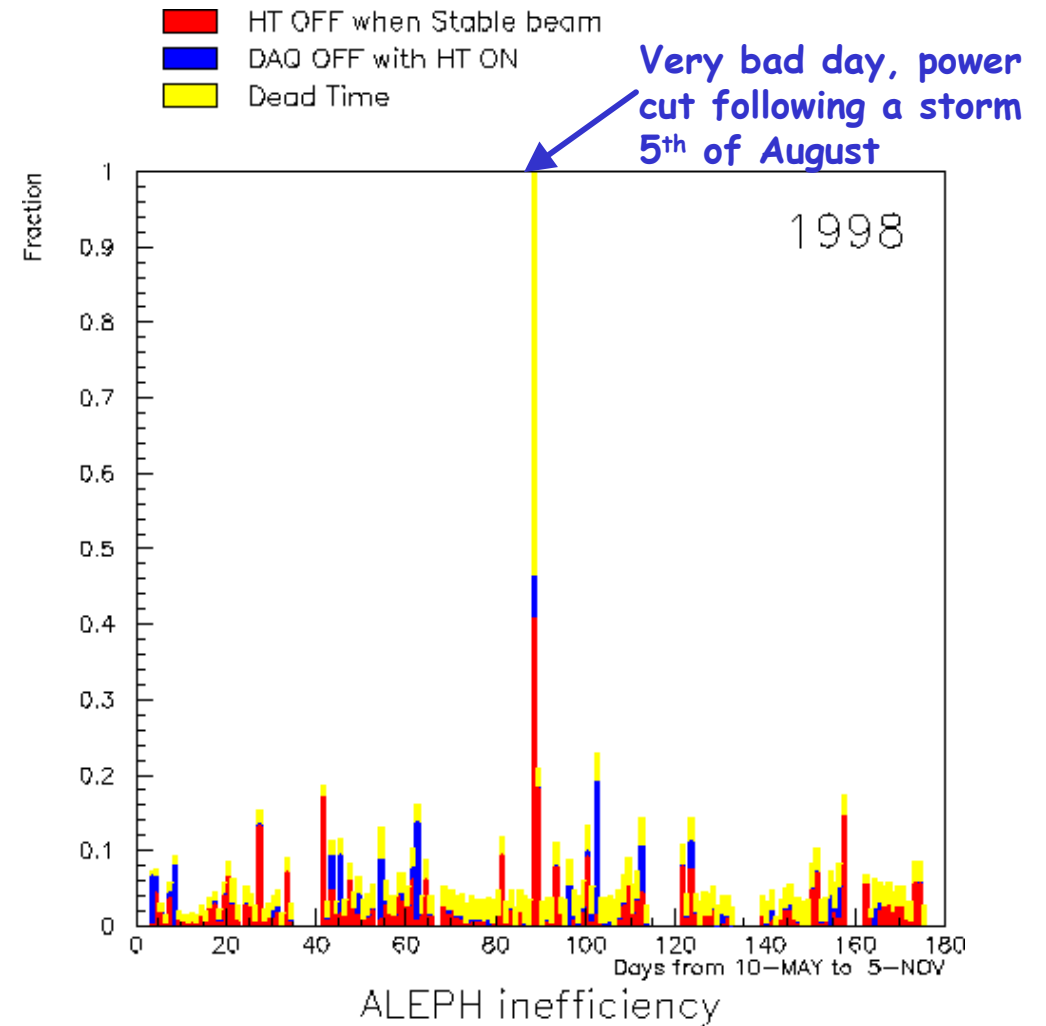


Congratulations to LEP !

Small inefficiencies

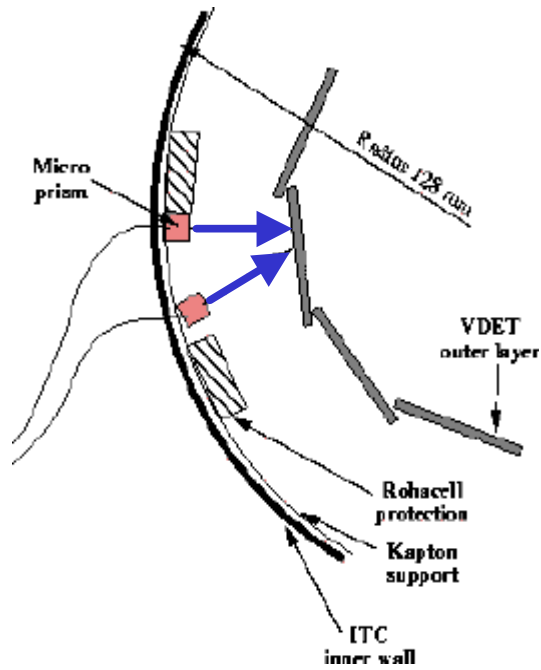


Efficiency = 93.1 %



VDET Rotation - 1

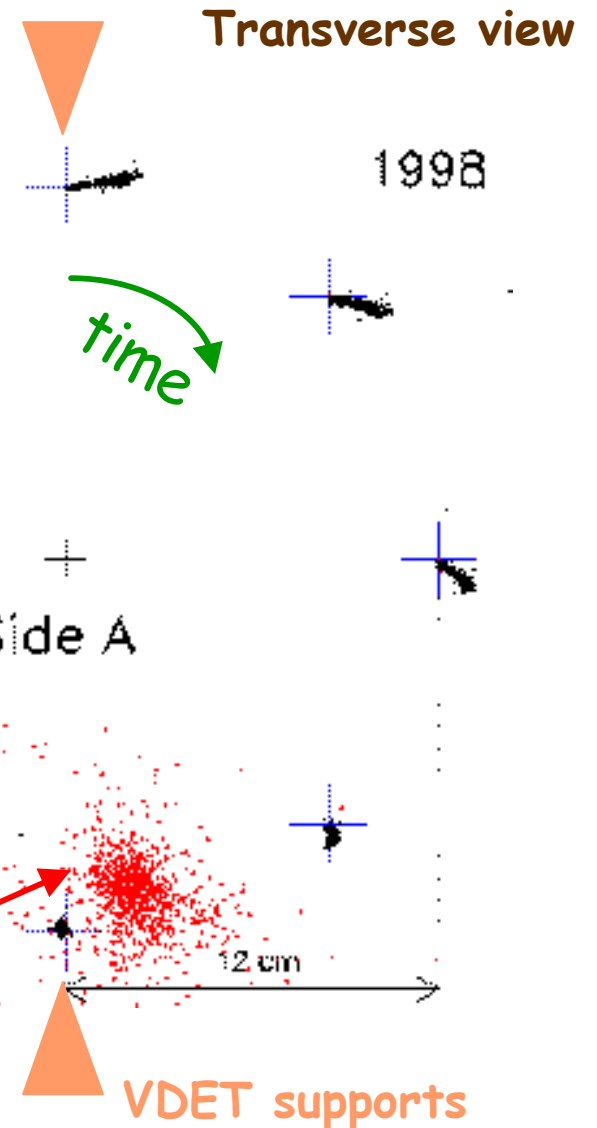
Laser spots on wafers
(outer layers)



+ Scale
20x20 mm²

Laser spot impacts
movements on VDET

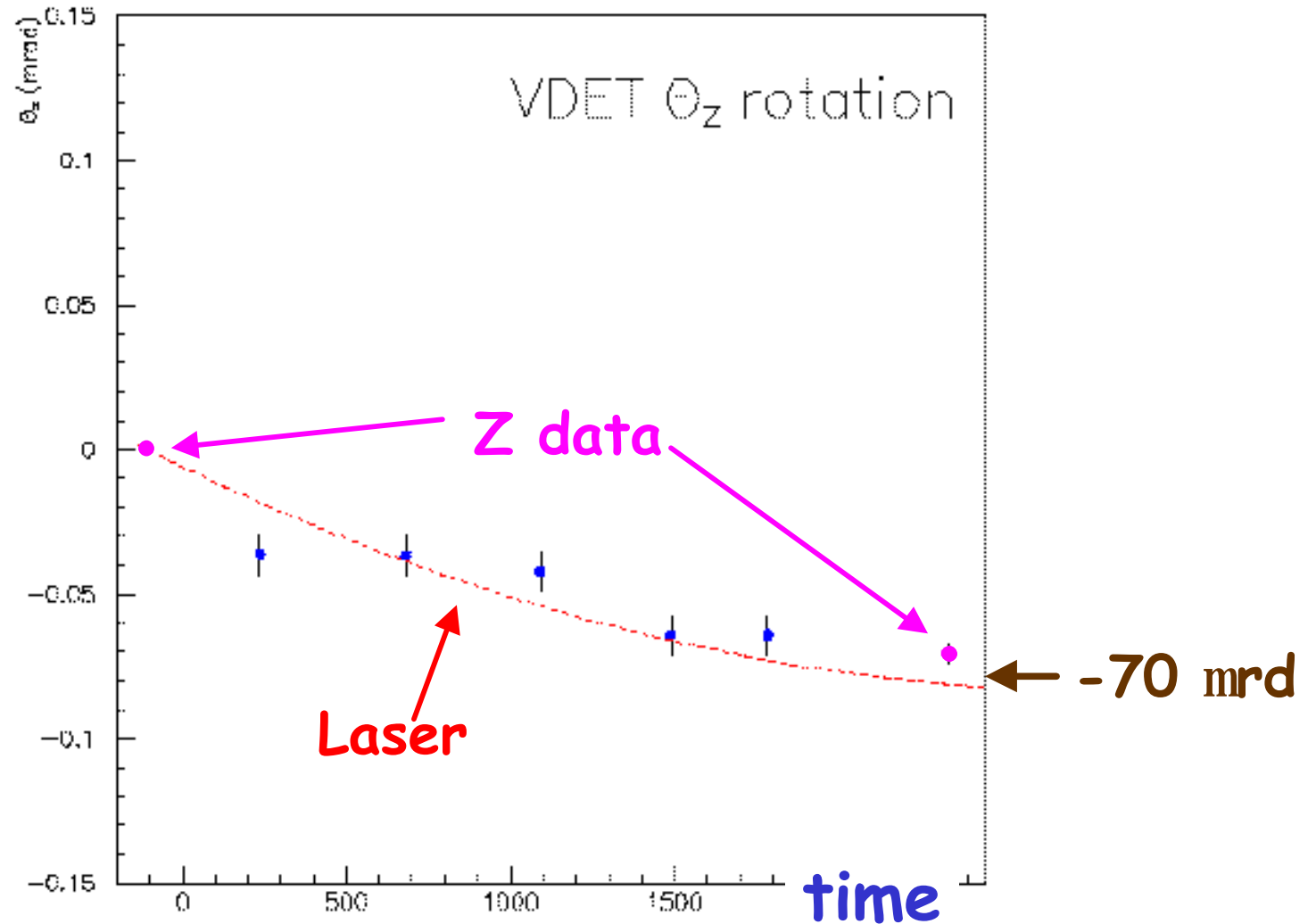
Effective fitted rotation point



Movement already observed last year,
confirmed by this year data

VDET Rotation - 2

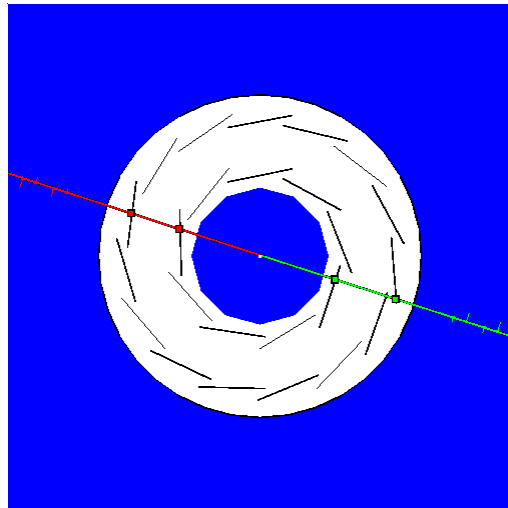
Rotation confirmed by 2nd Z run



VDET hit resolution

Di-muon evts

Residuals to di- μ single fit

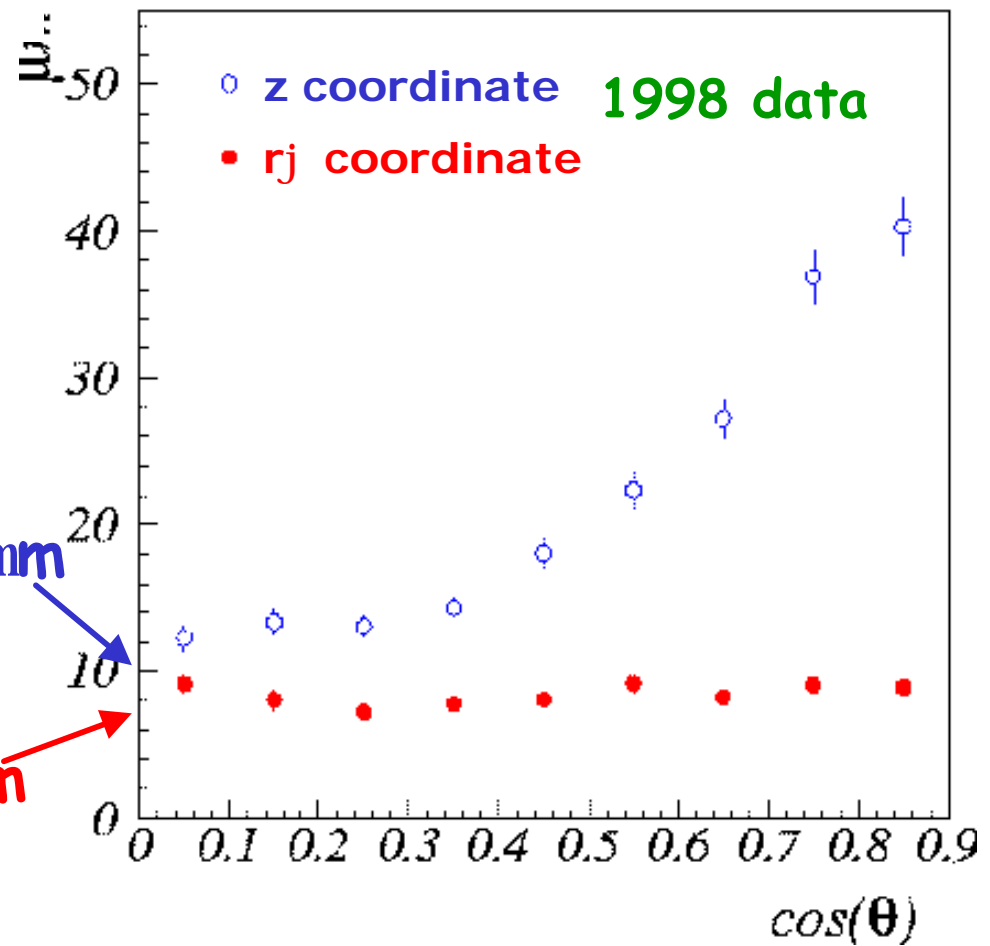


Expected resolutions at 90 deg.

10 mm

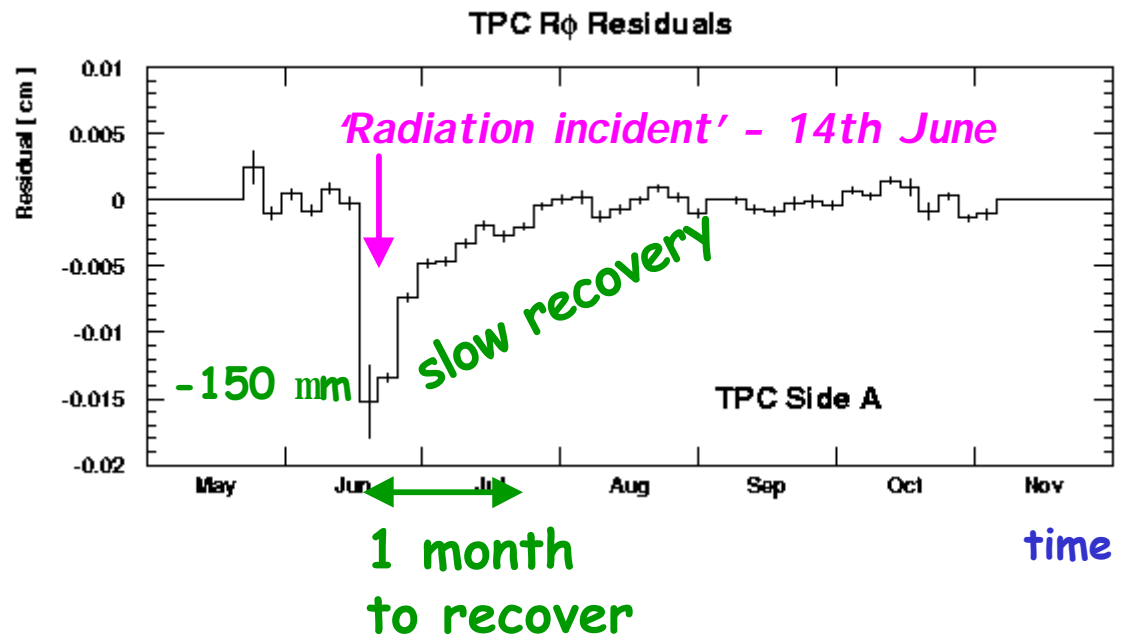
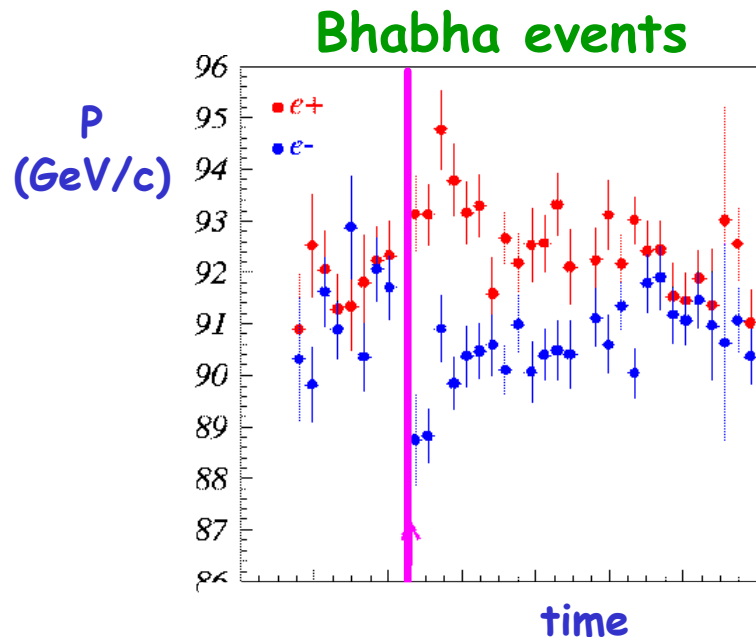
8 mm

Hit resolution vs polar angle



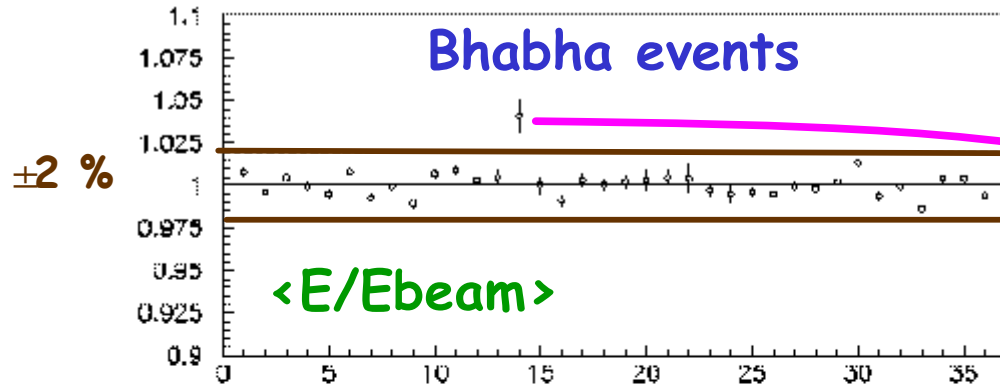
Radiation incident effect

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

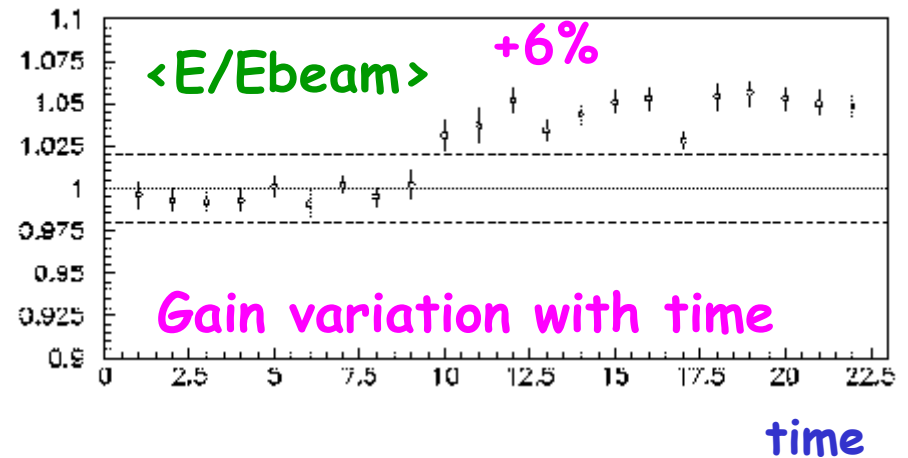
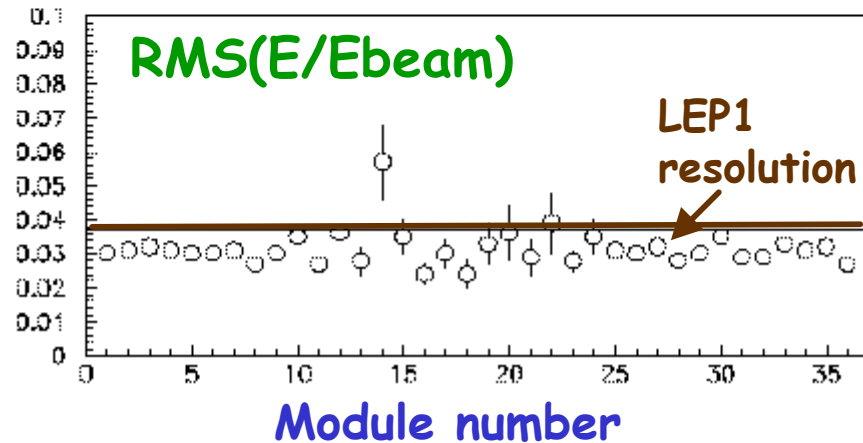


Taken care by the alignment
Recoverable by reprocessing of data

Electromagnetic calorimeter



Gas leak in a pump
8th August



Recoverable by reprocessing of data

189 GeV data
Preliminary results
from all collected luminosity

189 GeV data - 1

- **LARGE** amount of **integrated luminosity** collected, **systematics** have to be carefully studied (take time)
 - <2 % statistical precision expected on S^{WW}
 - 1 per mil on M_w
- **End of data taking one week ago**
 - **data quality is good**
 - reprocessing of '98 data will start 16th Nov.

189 GeV data - 2

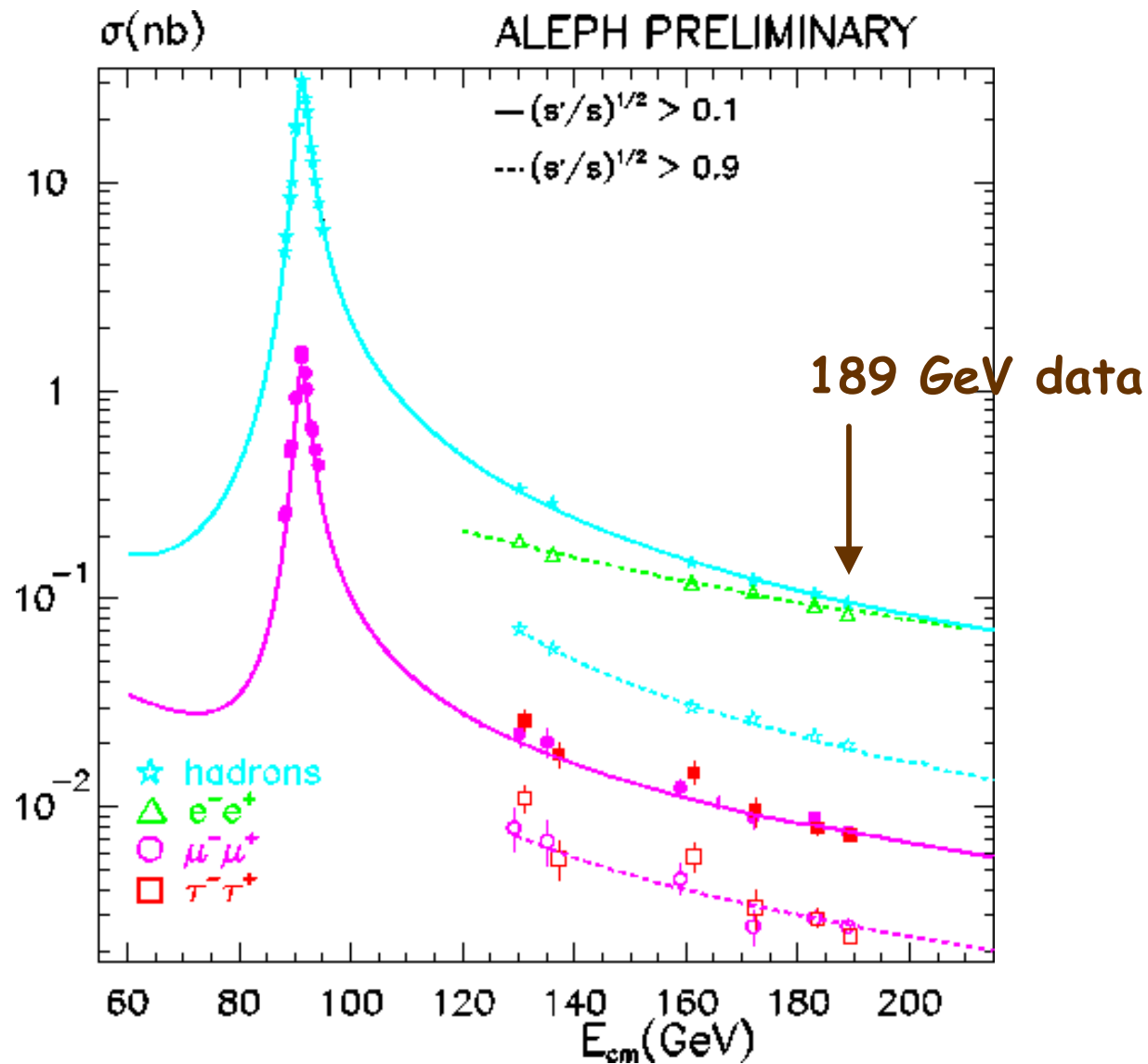
- 4-fermion final state analyses (WW , Higgs, ...) are complicated due for example to the increase in the ZZ process cross-section
- Need to understand the different 4f Monte-Carlos (even if they tend to agree at the cross section level)

189 GeV data - 3

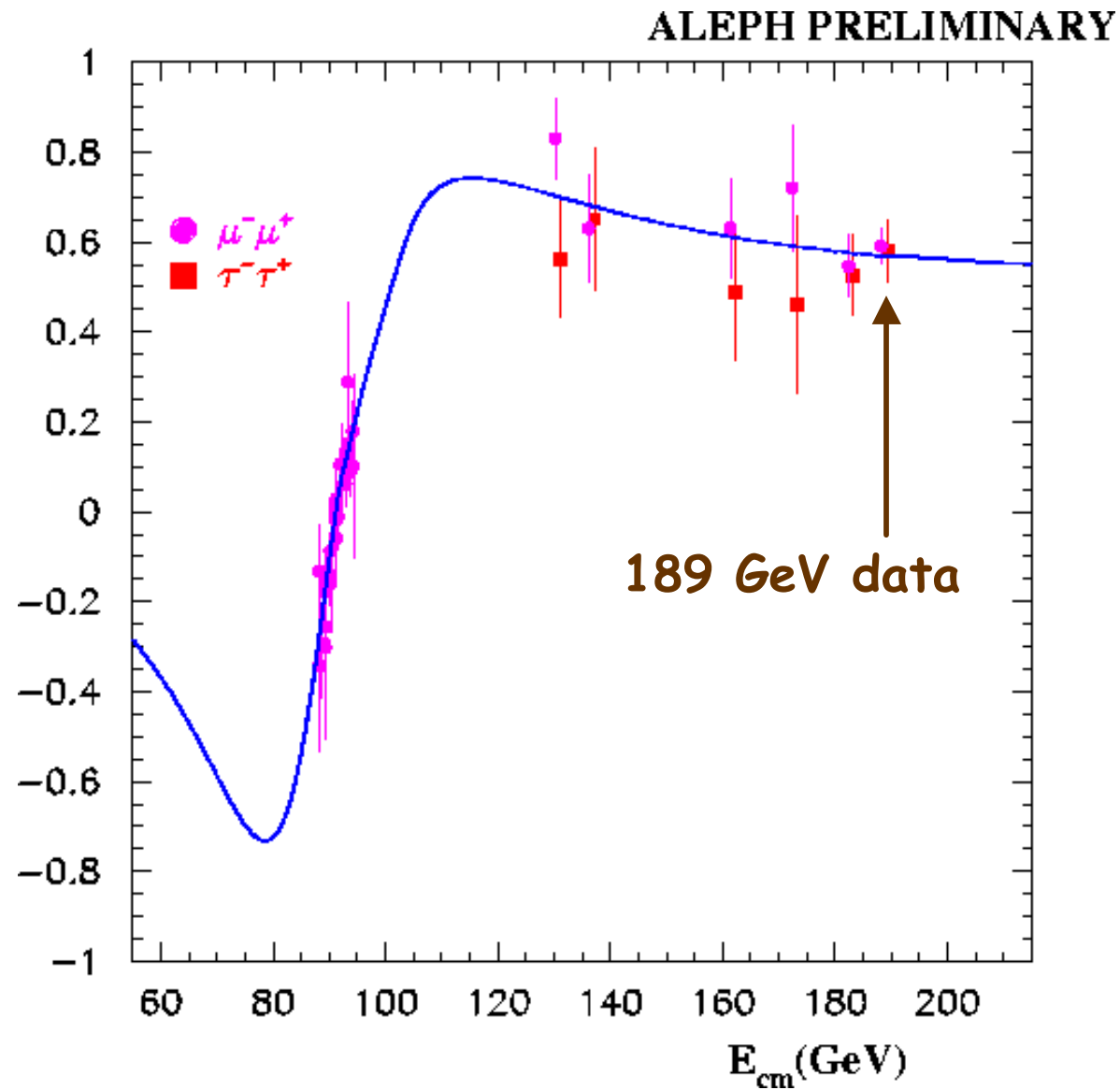
- Preliminary physics results only for topics which do not require precise
 - evaluation of systematics
 - background subtraction
 - No results on
 - WW cross section, W mass
 - Higgs (SM, MSSM)
- ...yet

2-fermion

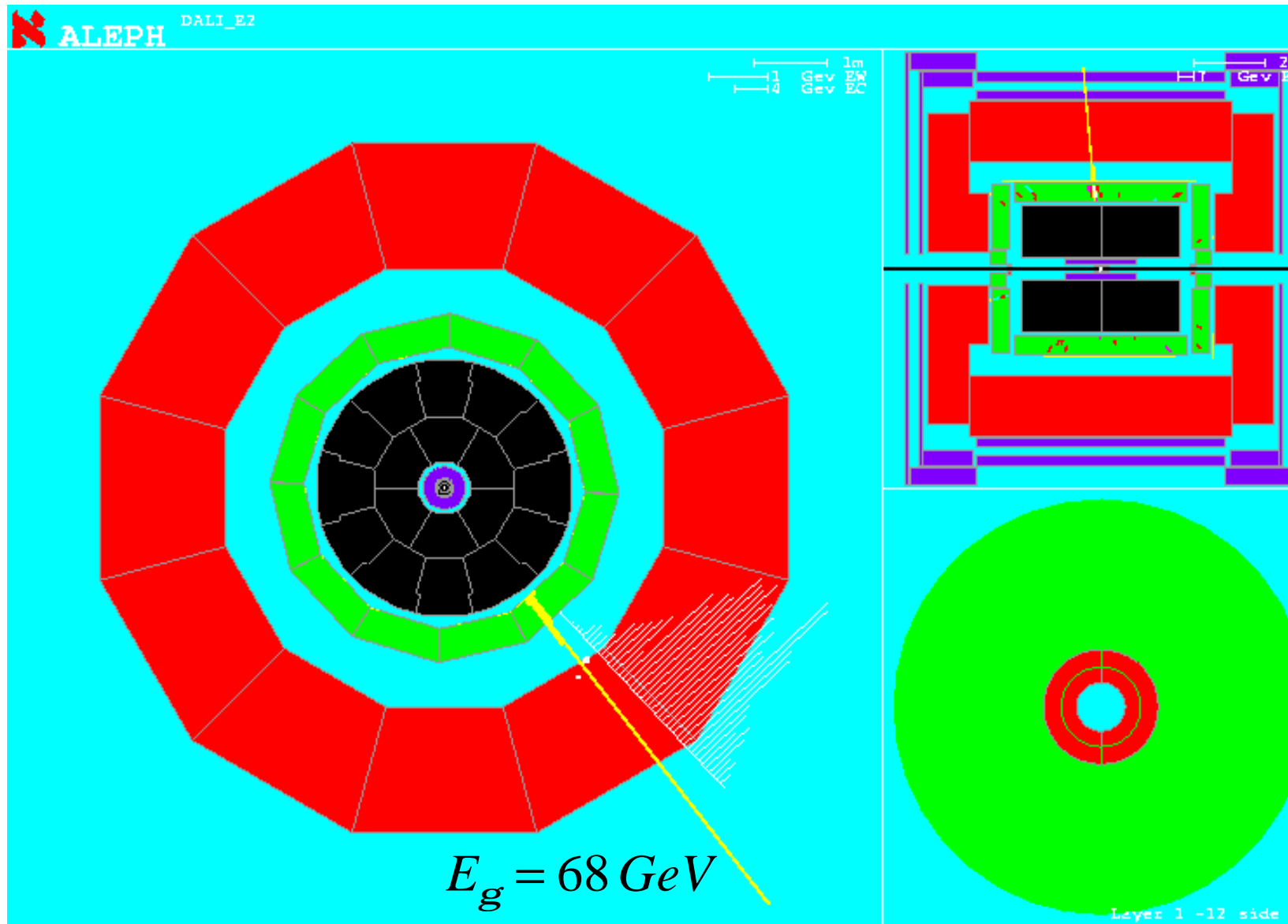
2-fermion cross-section



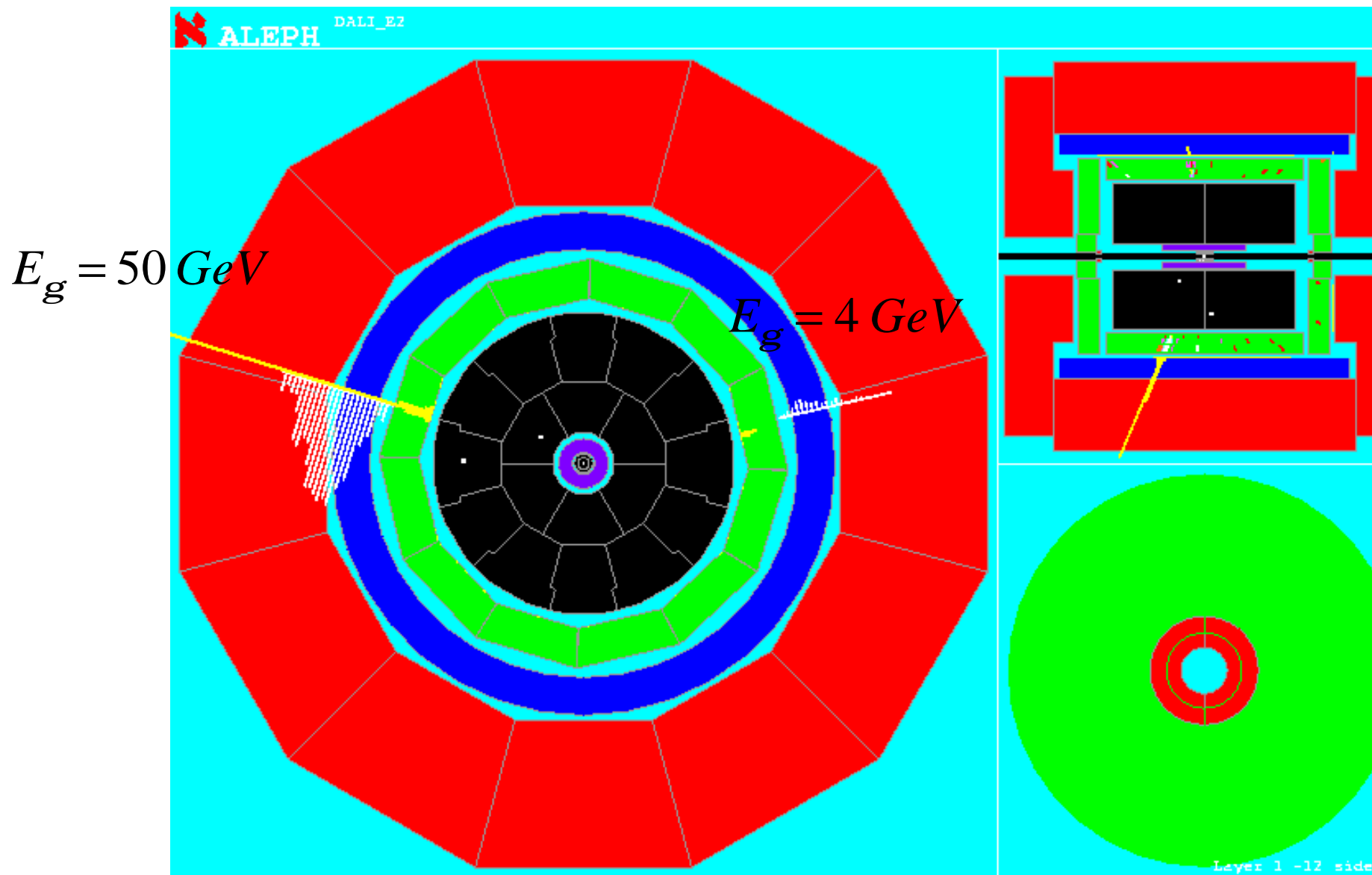
2-fermion asymmetries



Single- ξ event



2- ξ event

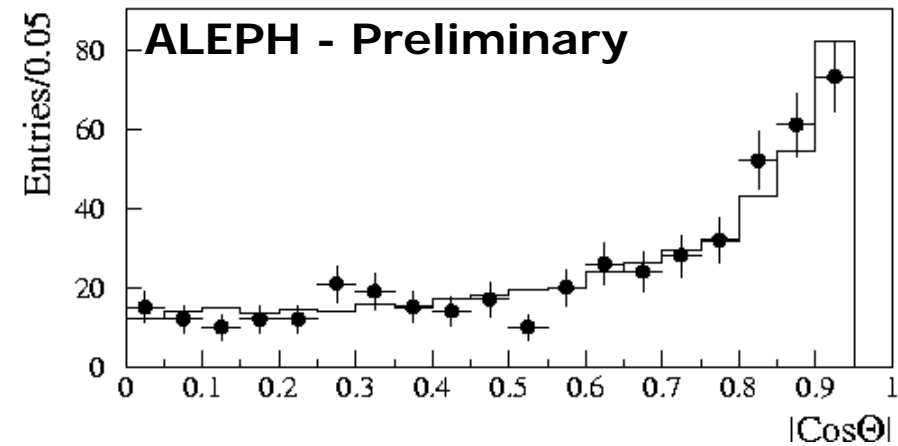
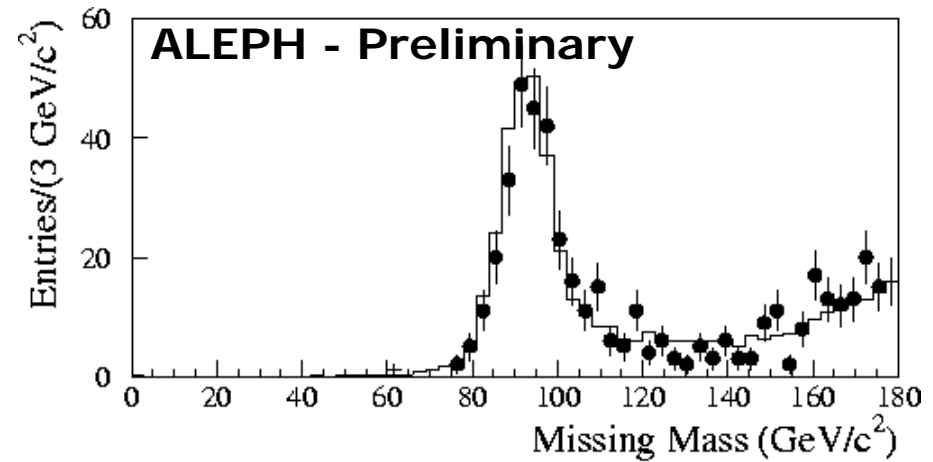


photon events

KORALZ

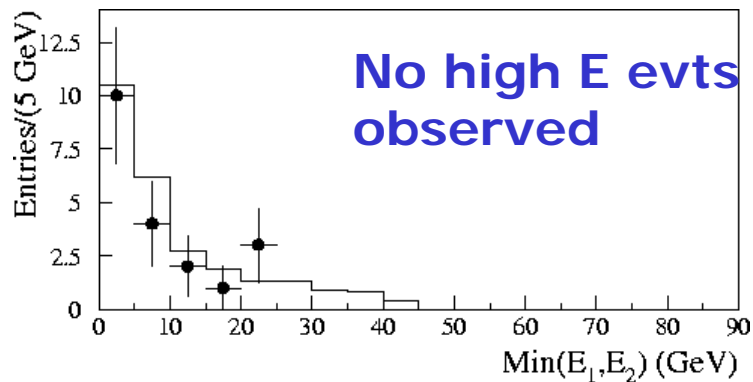
		# expected events	# observed events
1	σ_{γ}	480	473
2	σ_{γ}	25	18
3	σ_{γ}	.7	2

Single-photon events

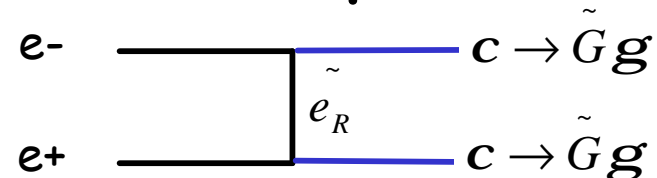


2-photon events

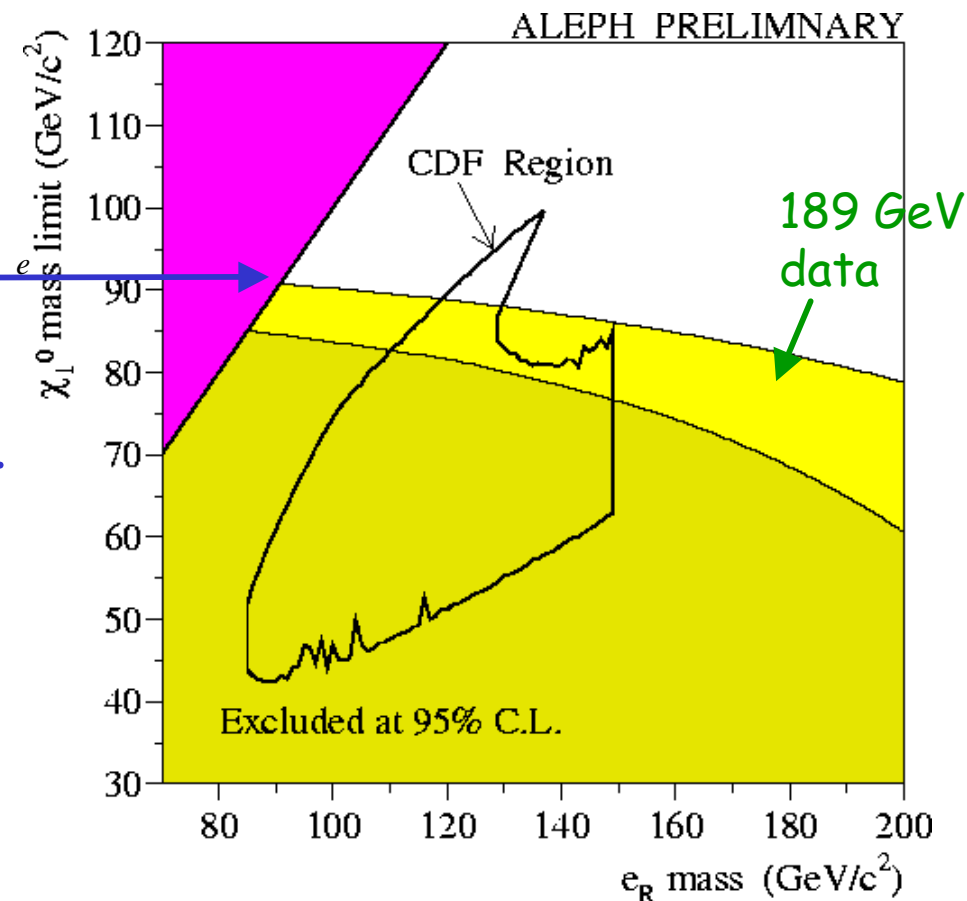
Minimum γ energy in acoplanar- γ pairs events



GMSB interpretation

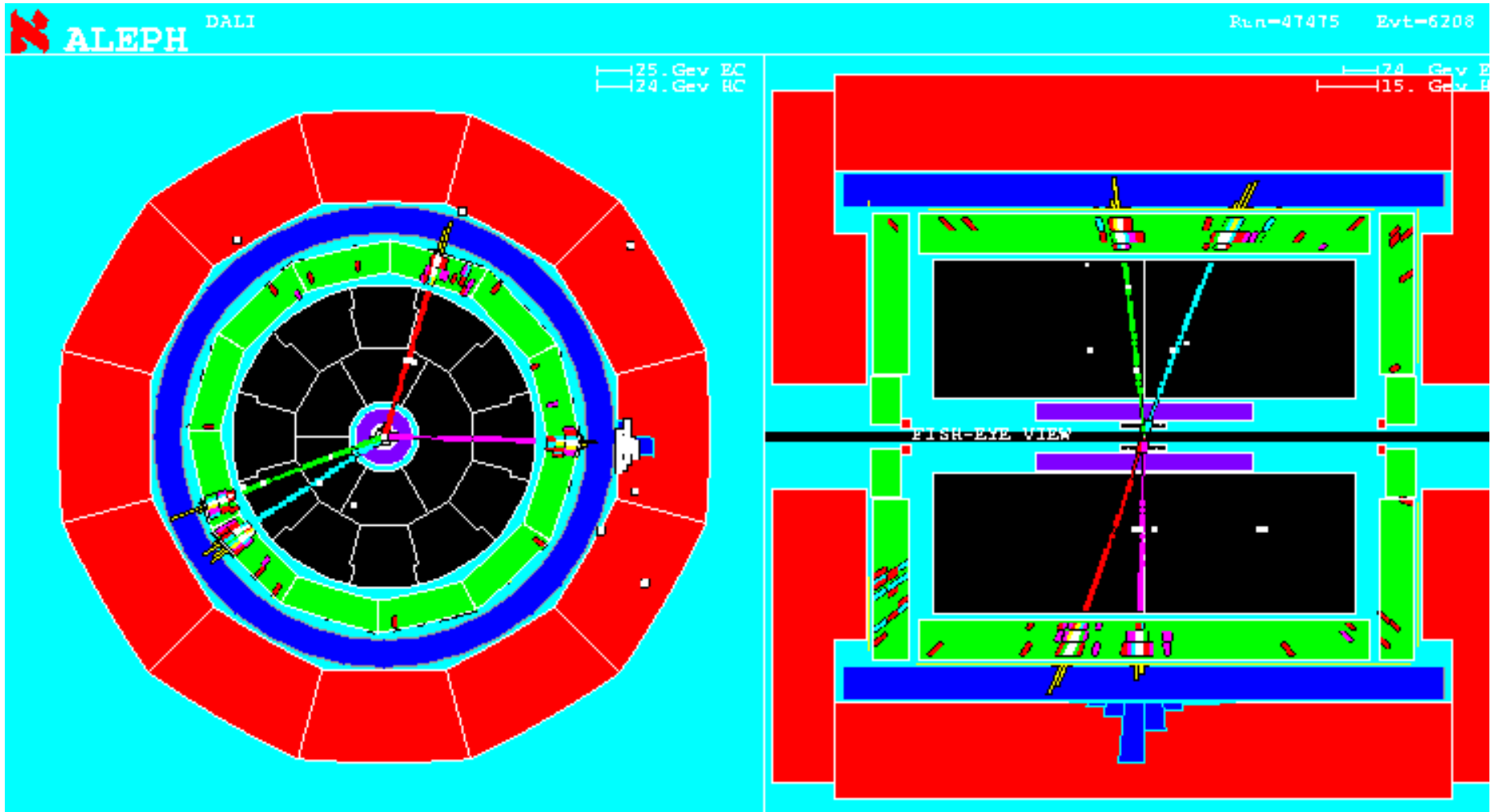


Kinematical limit



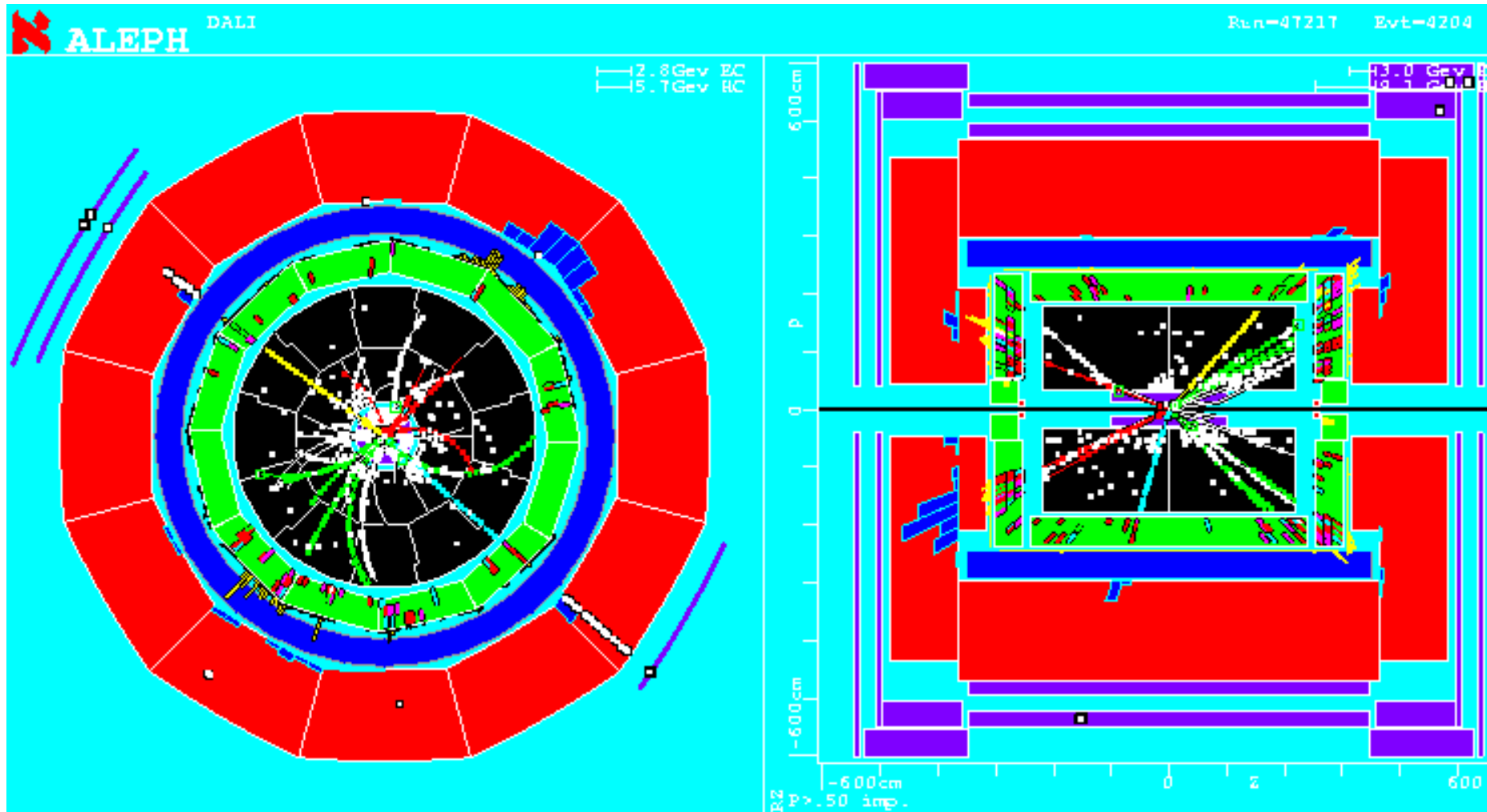
ZZ and WW

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



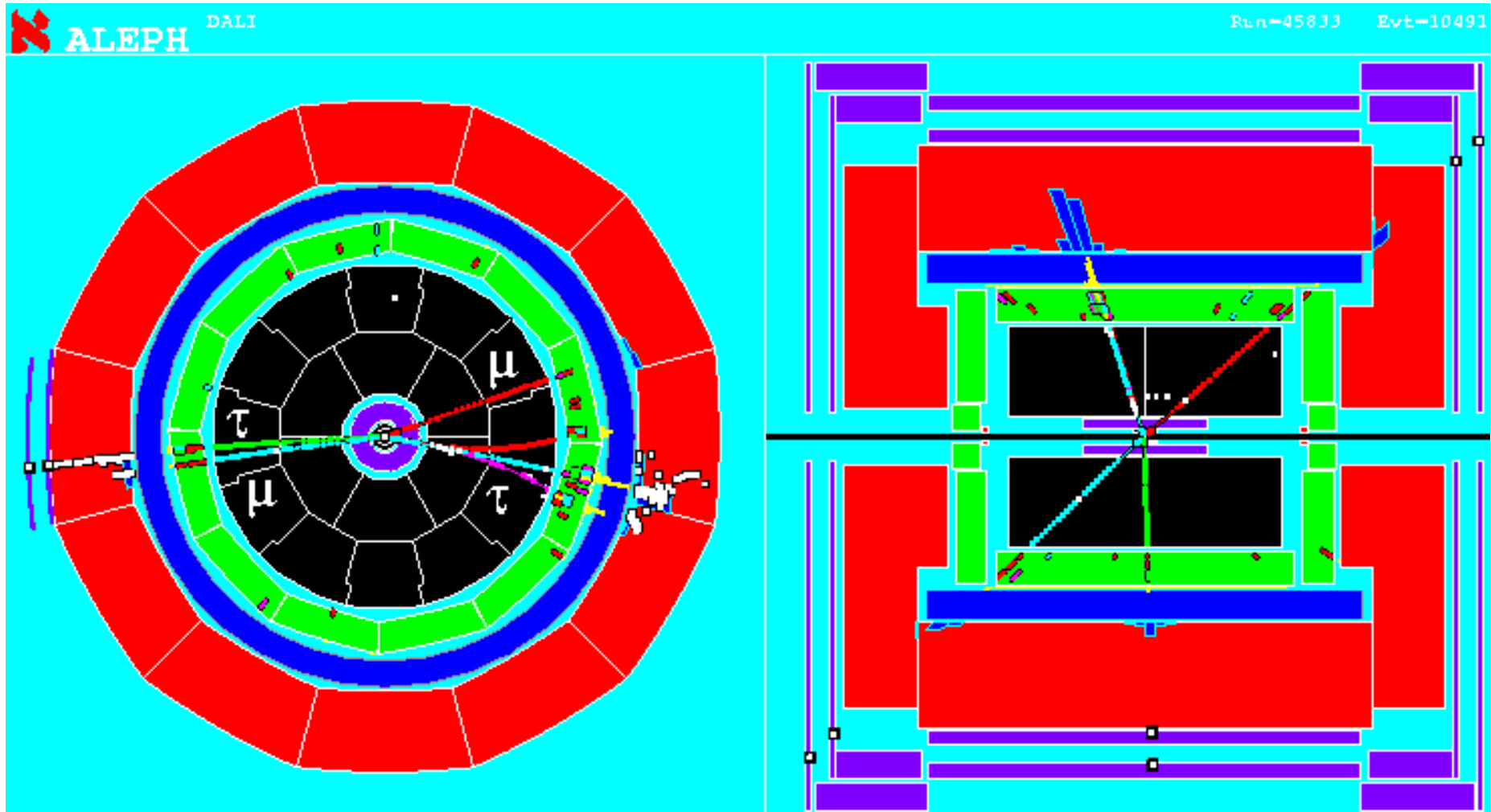
$$M_{e^+e^-}^1 = 88.7 \text{ GeV} / c^2 \quad M_{e^+e^-}^2 = 90.2 \text{ GeV} / c^2$$

$$e^+e^- \rightarrow Z^0 Z^0 \rightarrow m^+ m^- q \bar{q}$$



$$M_{m^+m^-} = 90.1 \text{ GeV} / c^2 \quad M_{m^+m^-}^{\text{recoil}} = 91.1 \text{ GeV} / c^2$$

$$e^+ e^- \rightarrow Z^0 Z^0 \rightarrow m^+ m^- t^+ t^-$$



$$M_{m^+ m^-} = 95.8 \text{ GeV} / c^2 \quad M_{m^+ m^-}^{recoil} = 90.2 \text{ GeV} / c^2$$

ZZ cross-section

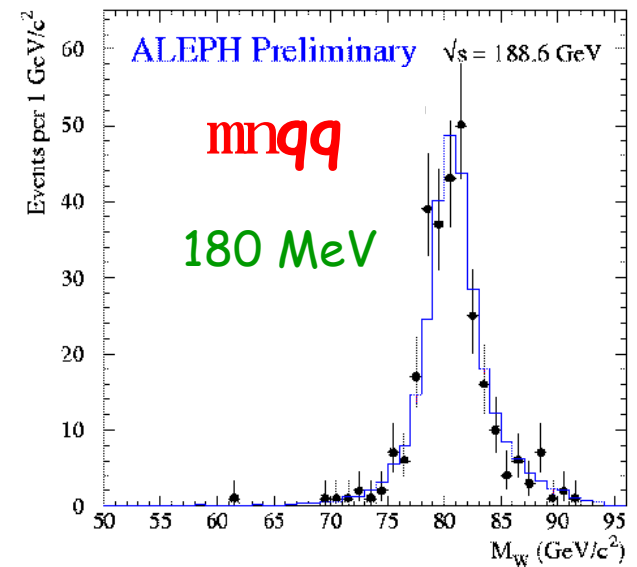
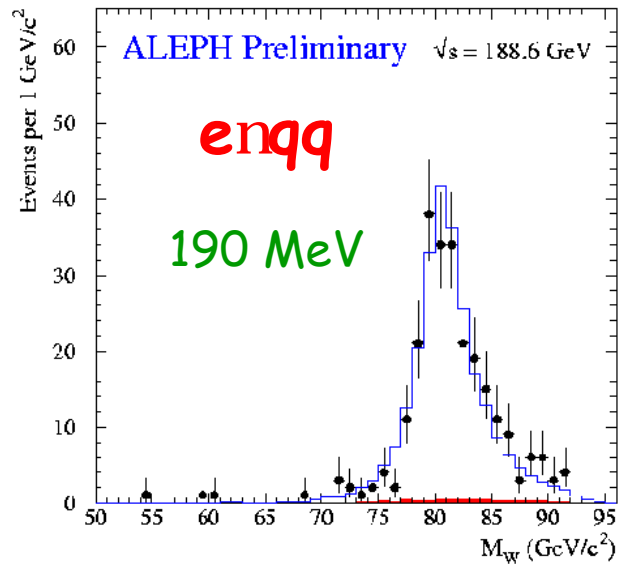


All visible channels analyzed
4q, llqq, qqvv, llvv

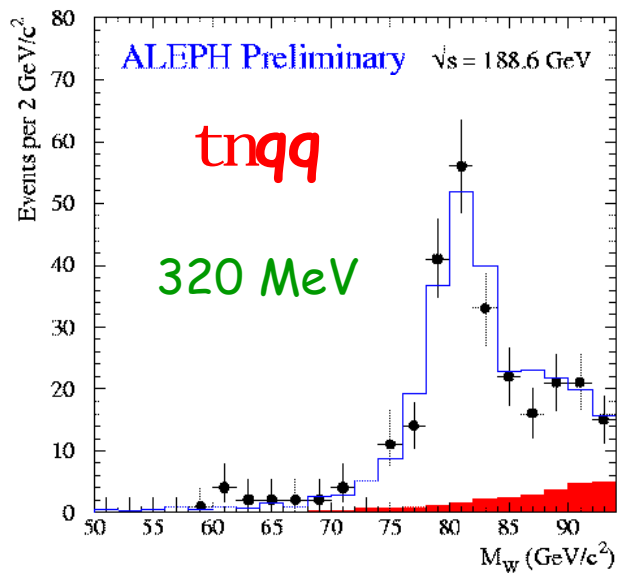
$$\mathbf{s}_{NC2}^{ZZ}(189 GeV) = 0.57 \pm 0.12(stat.) pb$$

SM: 0.67 pb

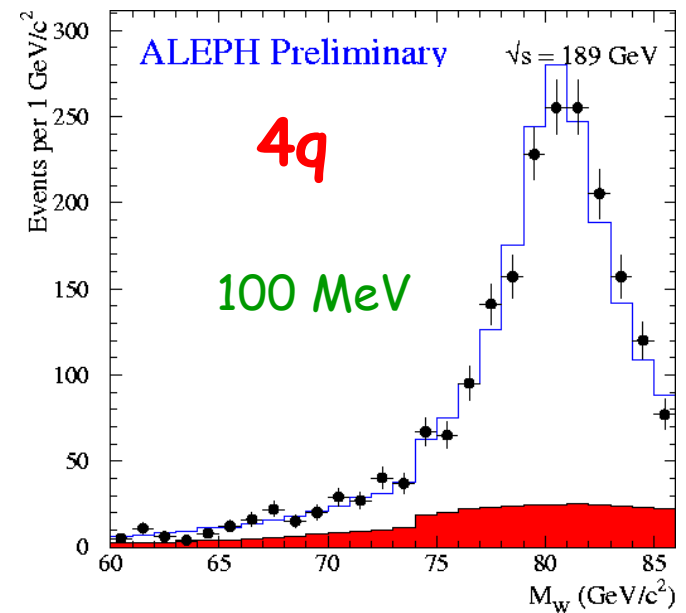
W mass



Expected
statistical
errors

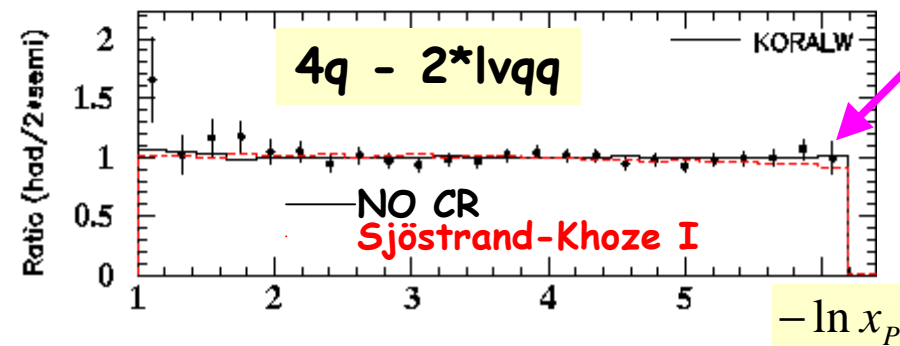
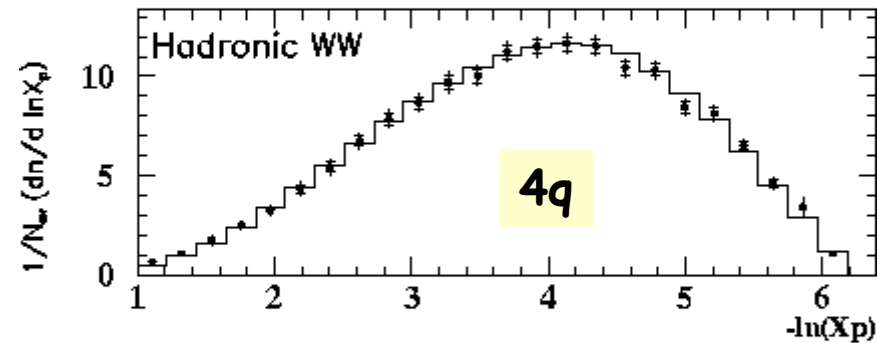
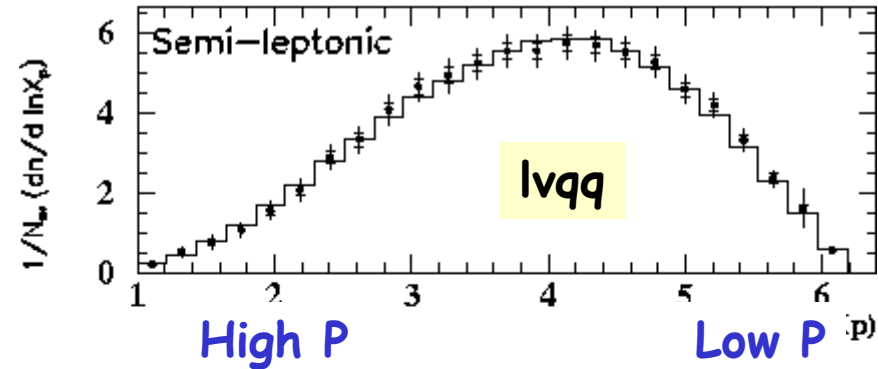


80 MeV
combined



Charged P distribution in W decays

ALEPH Preliminary 189

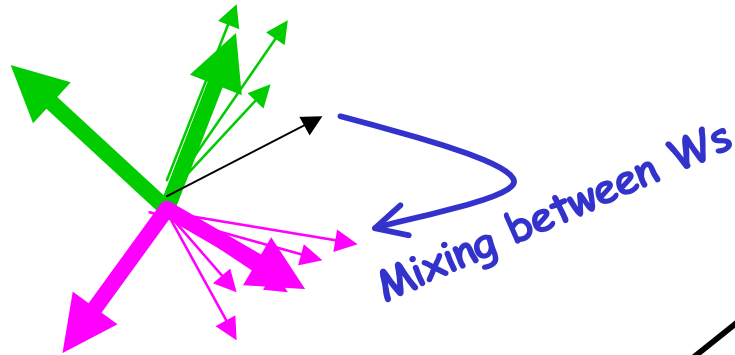


Where Color reconnection is expected to show up

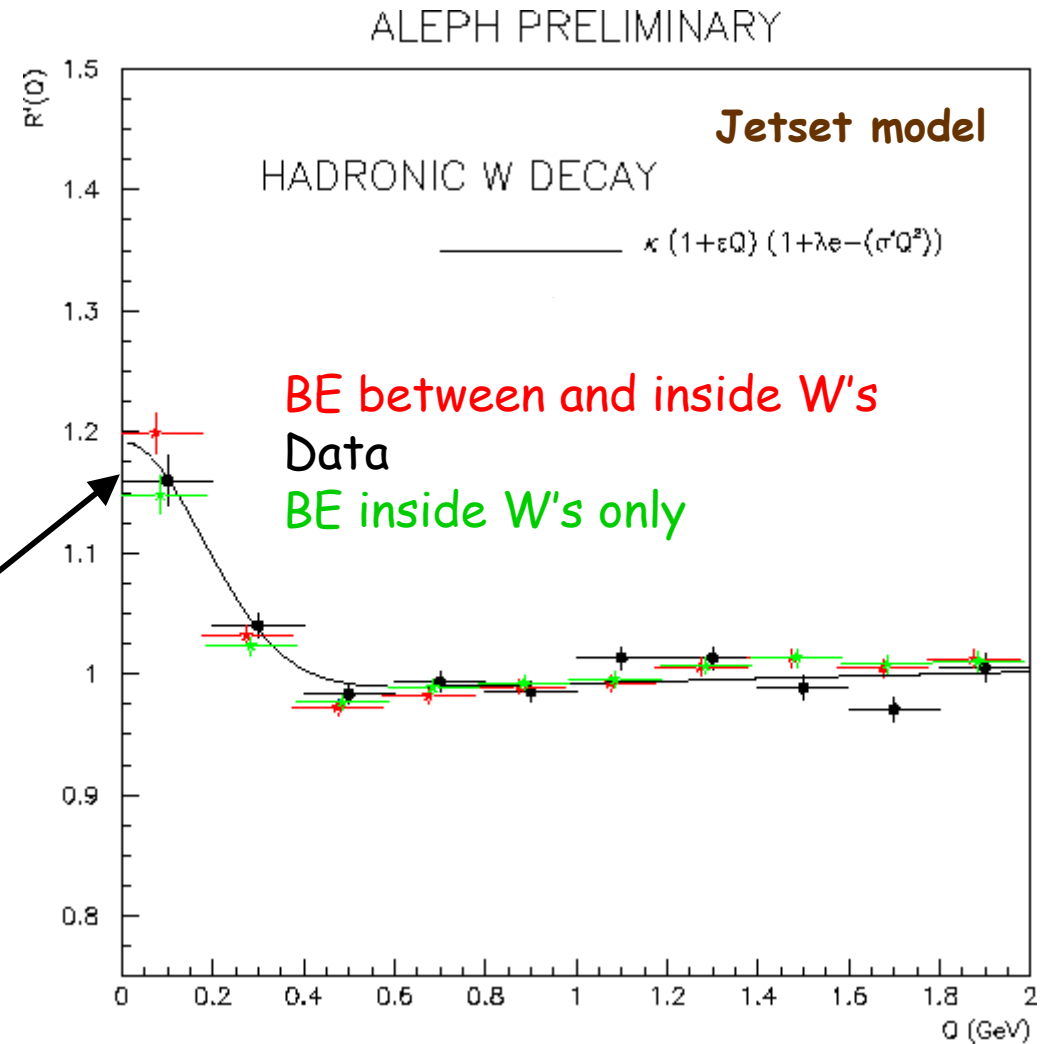
Bose-Einstein correlation

Correlation between same sign pions

- BE between Ws?
- Systematic on mass?



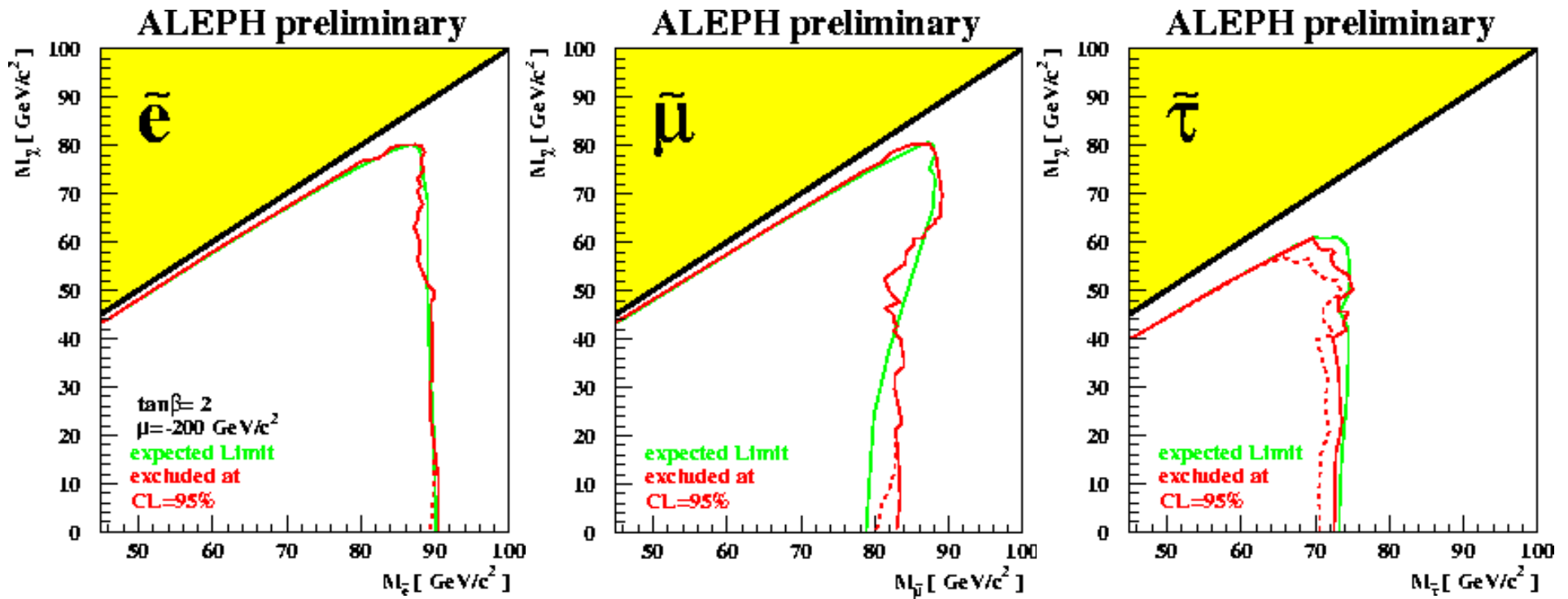
Statistical error becomes interesting



SUSY searches

Sleptons

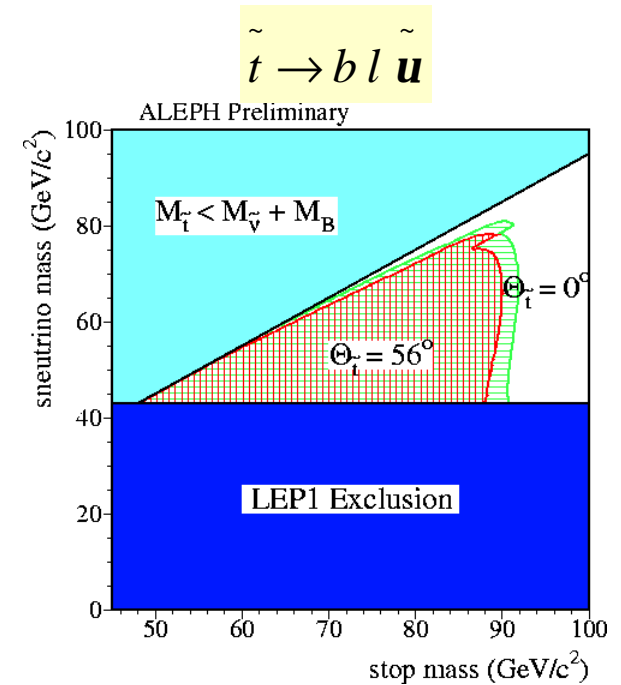
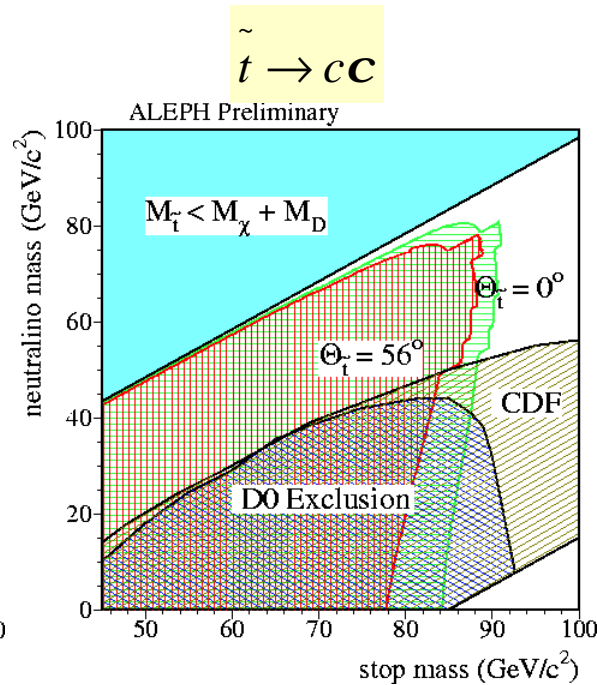
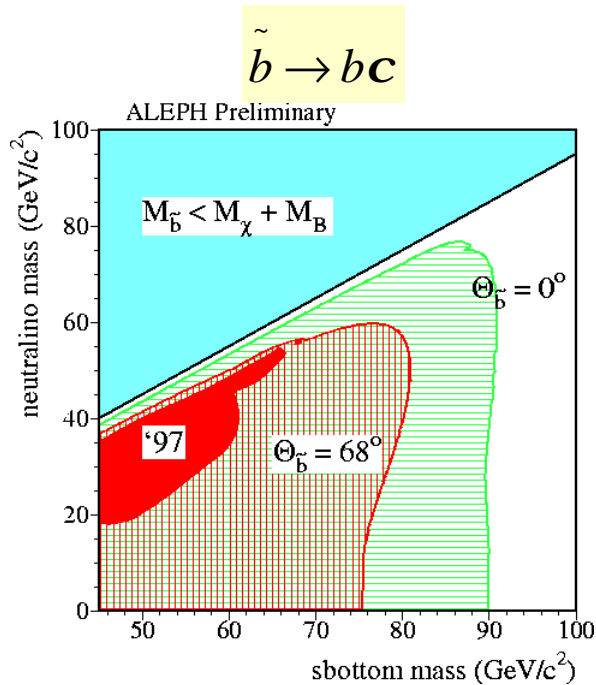
Channel	# expected events	# observed events	Limit (GeV) At $M_C=0$	Improvement (GeV)
ee	33.7	34	90	~4
mm	30.6	27	83	~8
tt	17.1	21	73	~2



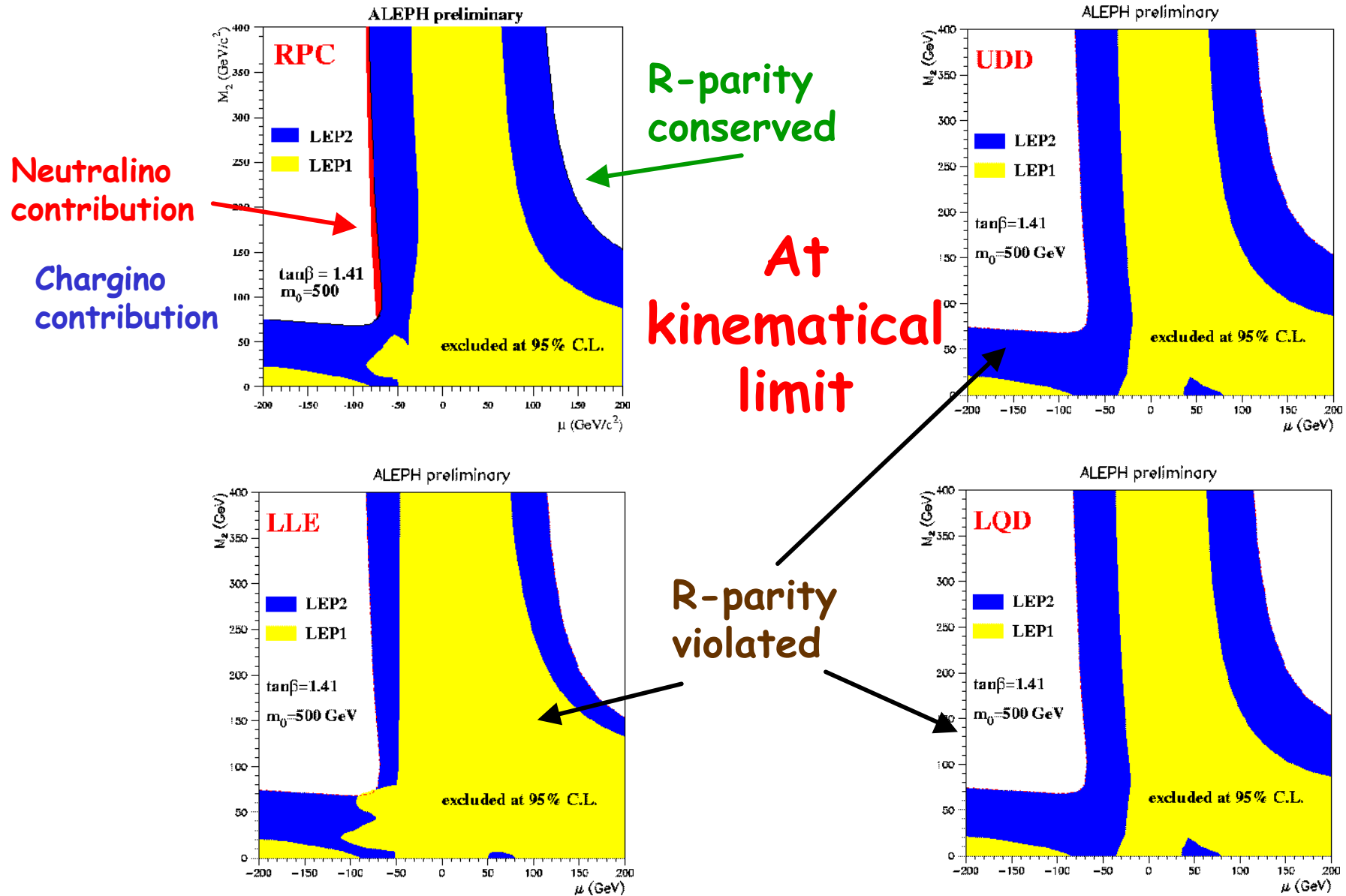
Squarks

Channel	Expt. Events	Obsv. Events	Improvement (GeV)
$t^{\text{R}} c c$	7.9	7	~8
$b^{\text{R}} b c$	0.7	0	~10
$t^{\text{R}} b l n$	2.2	1	~6

Mass limits around 90 GeV
for $m_c=0$ and mixing angle = 0°



Chargino/neutralino searches

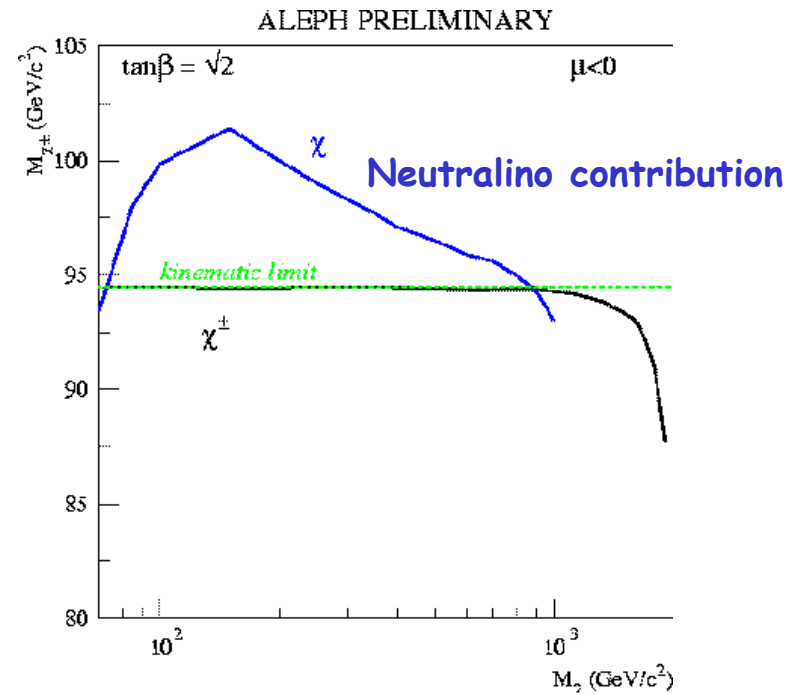
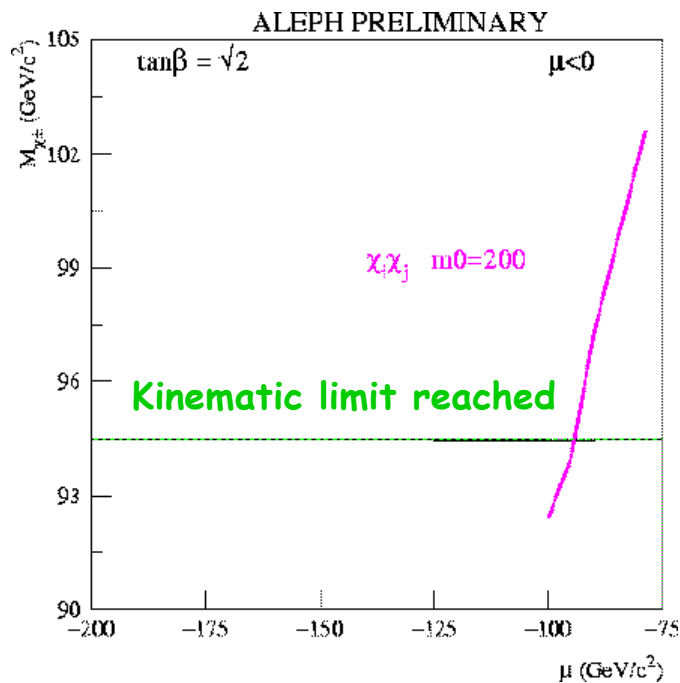


Chargino mass limit

Channel	# exp. Events	# obsv. Events
cc'	1.6	1
c^+c^-	5.5	7

Gaugino region

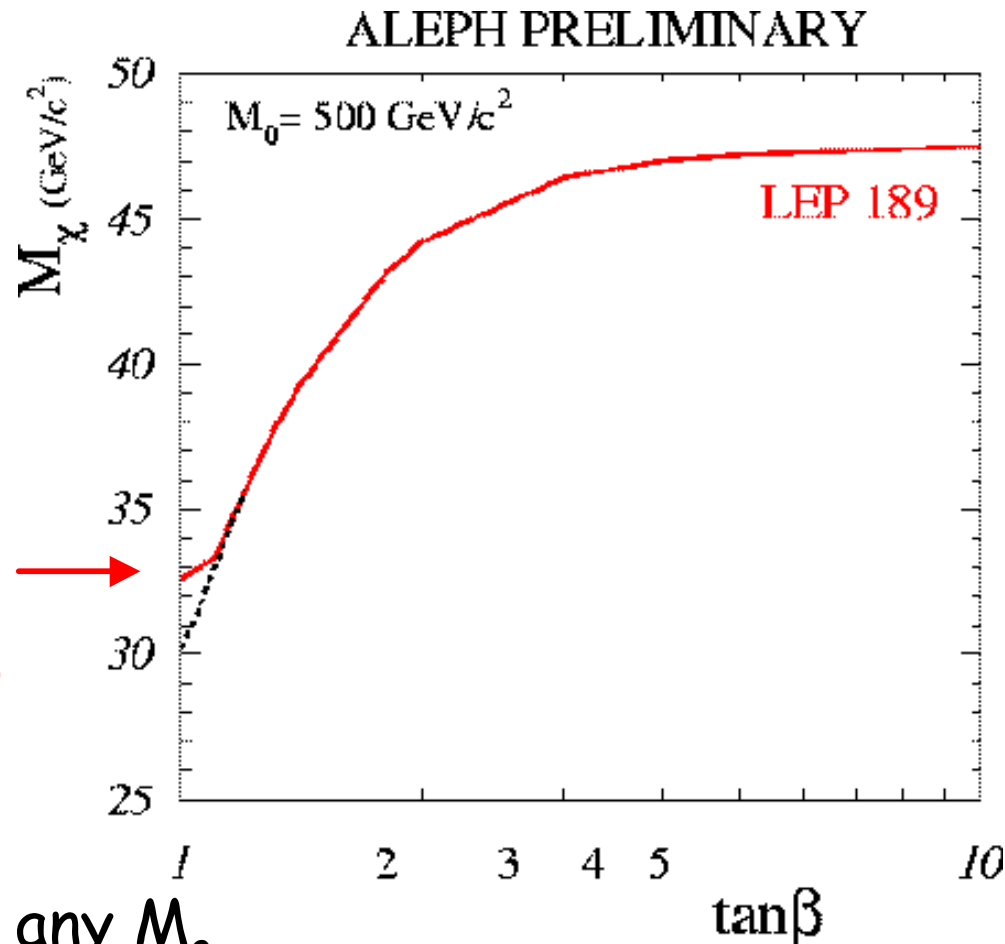
Higgsino region



lsp mass limit

lightest supersymmetric
partner mass limit

32.6 GeV
for large M_0

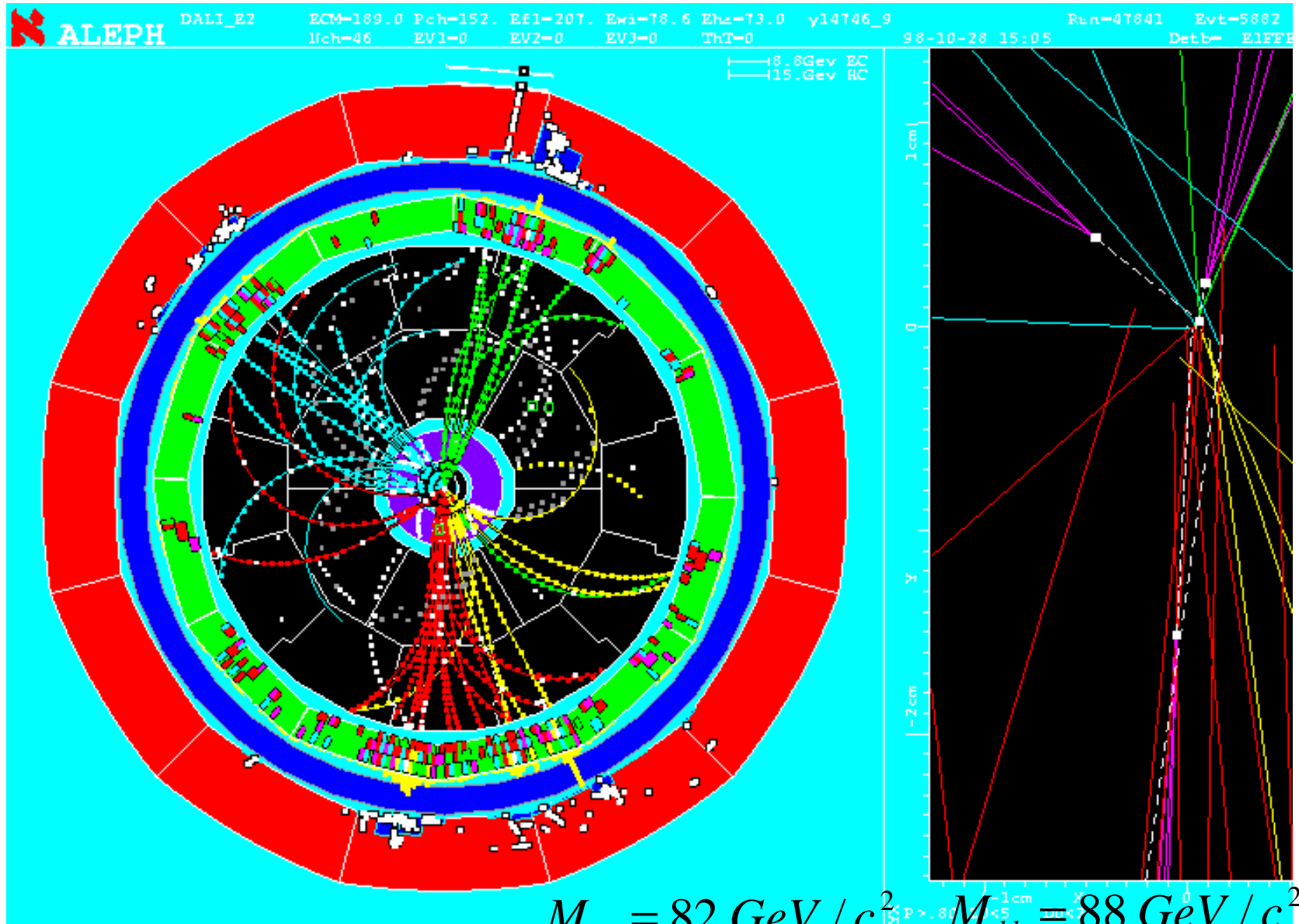


Absolute limit for any M_0
and $\tan\beta$ should be between
27 and 32.6 GeV

Higgs

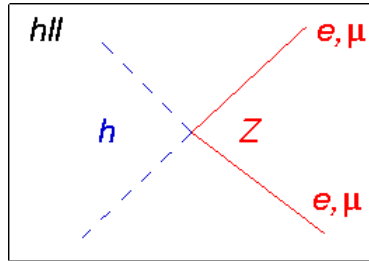
We have some nice events

4b event

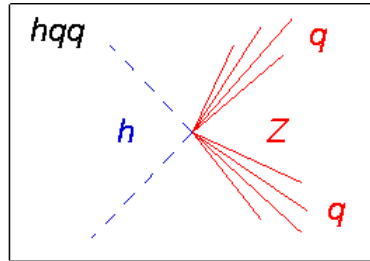


Invisible Higgs decays

$$e^+e^- \rightarrow hZ$$

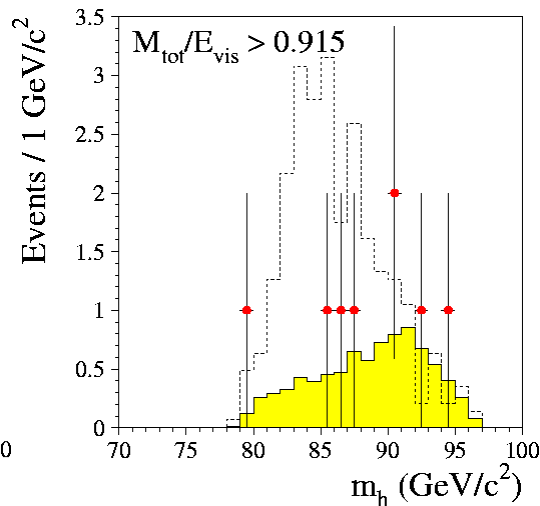
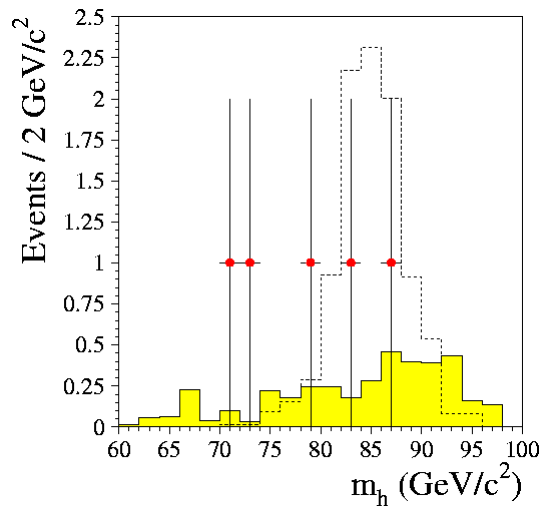
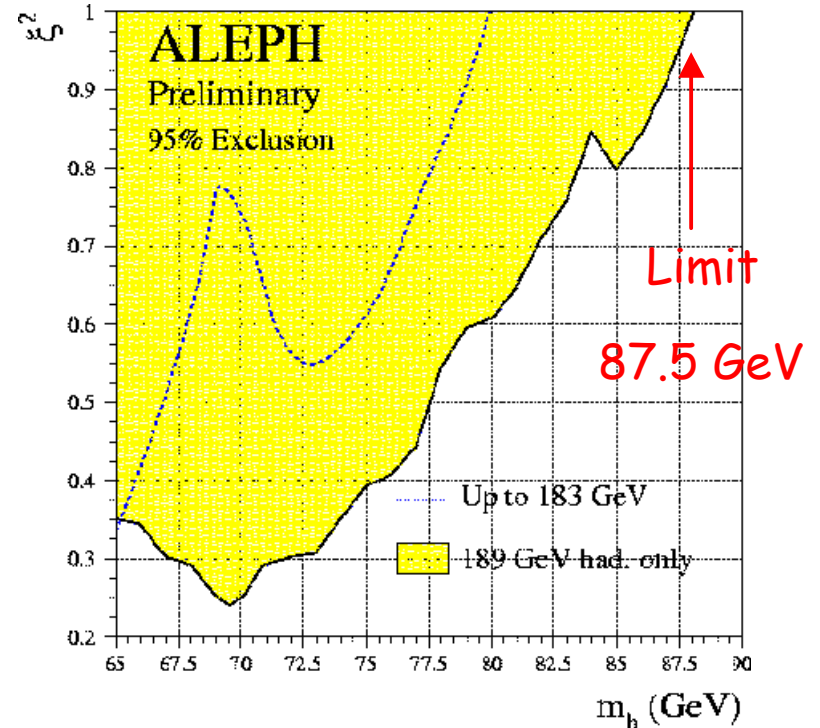


Acoplanar leptons
with mass $\sim M_Z$



Acoplanar jets
with mass $\sim M_Z$

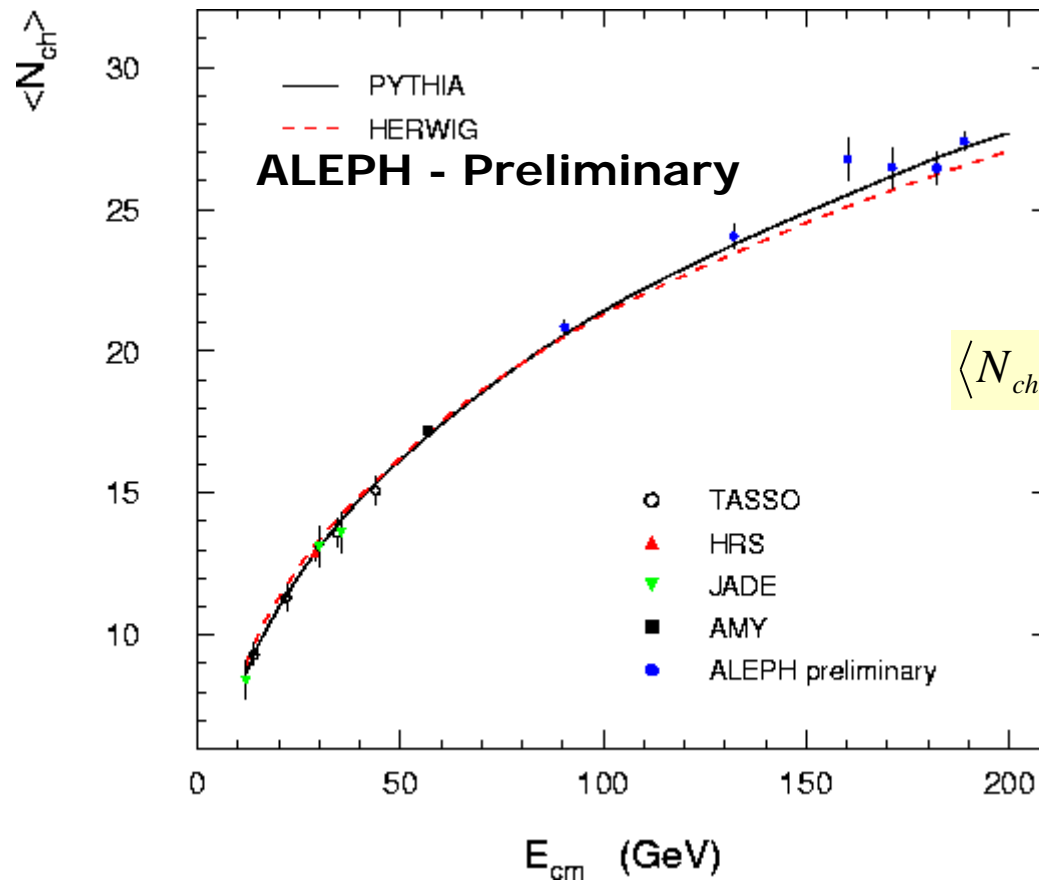
$$s((h \rightarrow inv.)Z) = \mathbf{x}^2 \times s(HZ)_{SM}$$



	Hll	Hqq
Expected background	3.8	8.8
Observed events	5	8

QCD studies

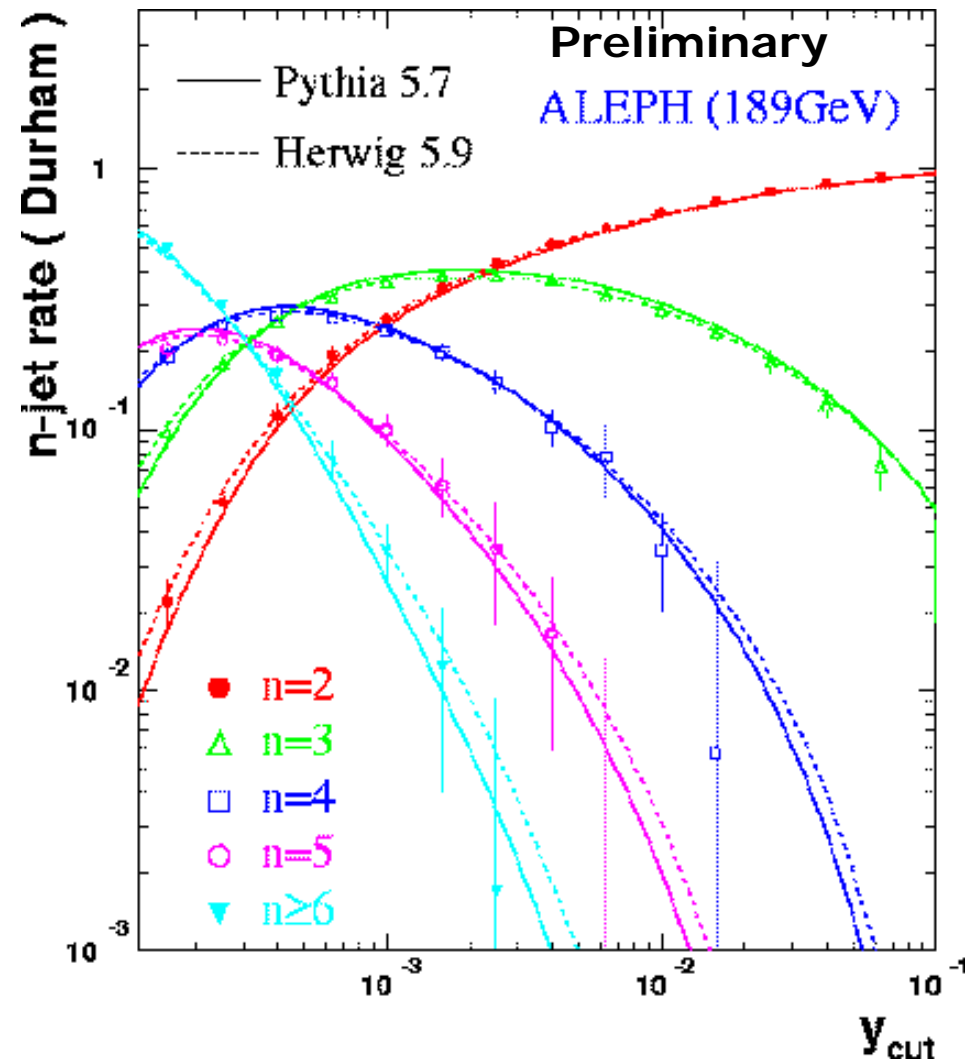
Charged multiplicity



189 GeV

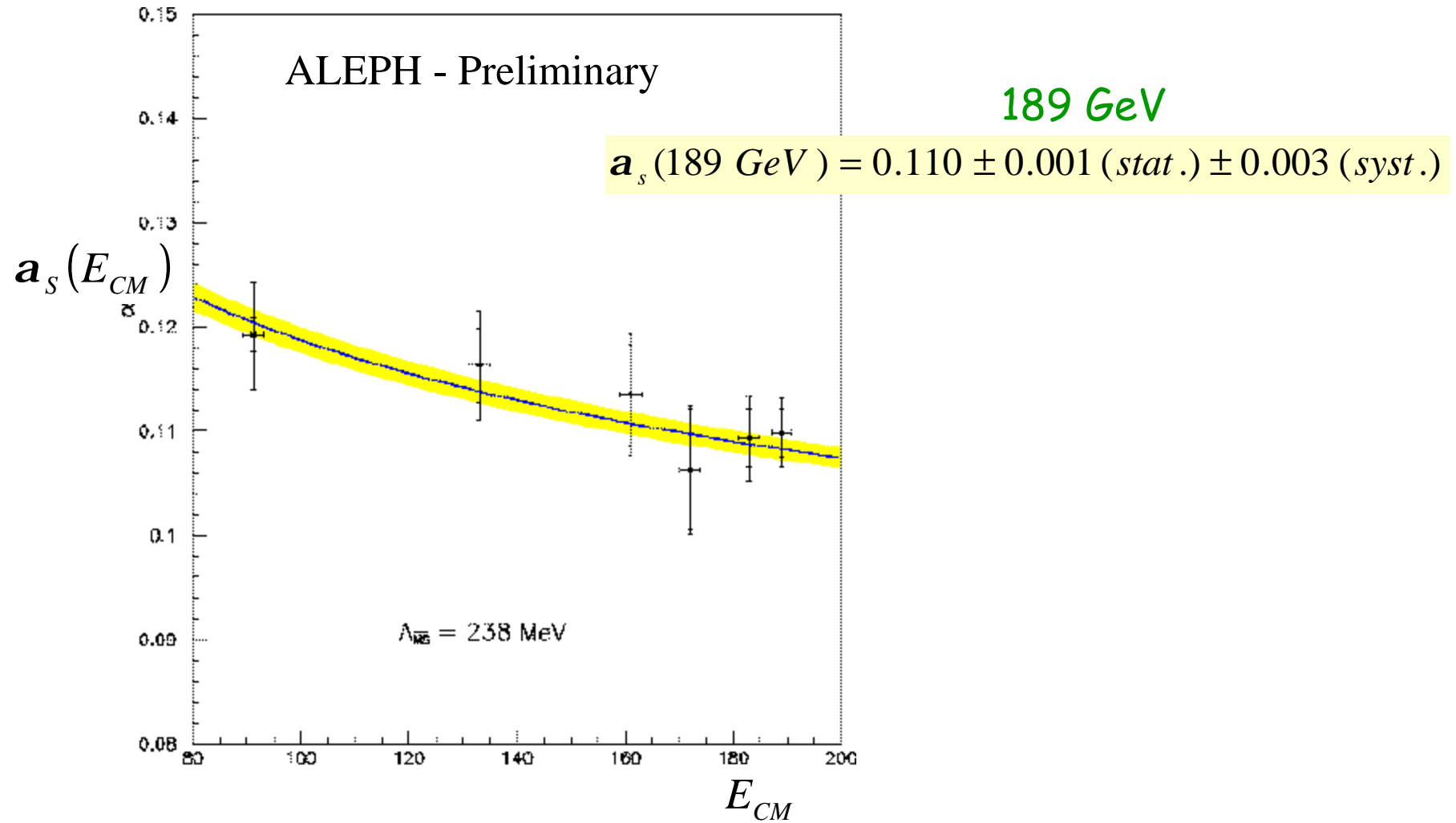
$$\langle N_{ch} \rangle = 27.37 \pm 0.20 \text{ (stat.)} \pm 0.27 \text{ (syst.)}$$

Jet rates



4-jet rate OK

a_s



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 deemed necessary for the most efficient operation as the energy increases
- Over all energies taken in 1999, we hope for an integrated luminosity similar or better than this year