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7-Sep-1999
LEPC

Status Report

Topics

- Central Jet Chamber incident
- Statistics & data quality
- Running during the rest of 1999
  & analysis after LEP stop

Central Jet Chamber Incident

- During OPAL startup phase (before LEP running)

  ↳ ϟ spark ϟ in central jet chamber
  after 2 ½ h on full volts (mid April)

  ↳ permanent damage:
  short of ~ MΩ (variable) between
  field shaping strips
  (1/24 sectors affected)

  ↖ typical for carbon/graphite trace on surface

  ↳ no repair/exchange possible:
  would need to open pressure vessel
  + jet chamber into clean room (~ 16 weeks)

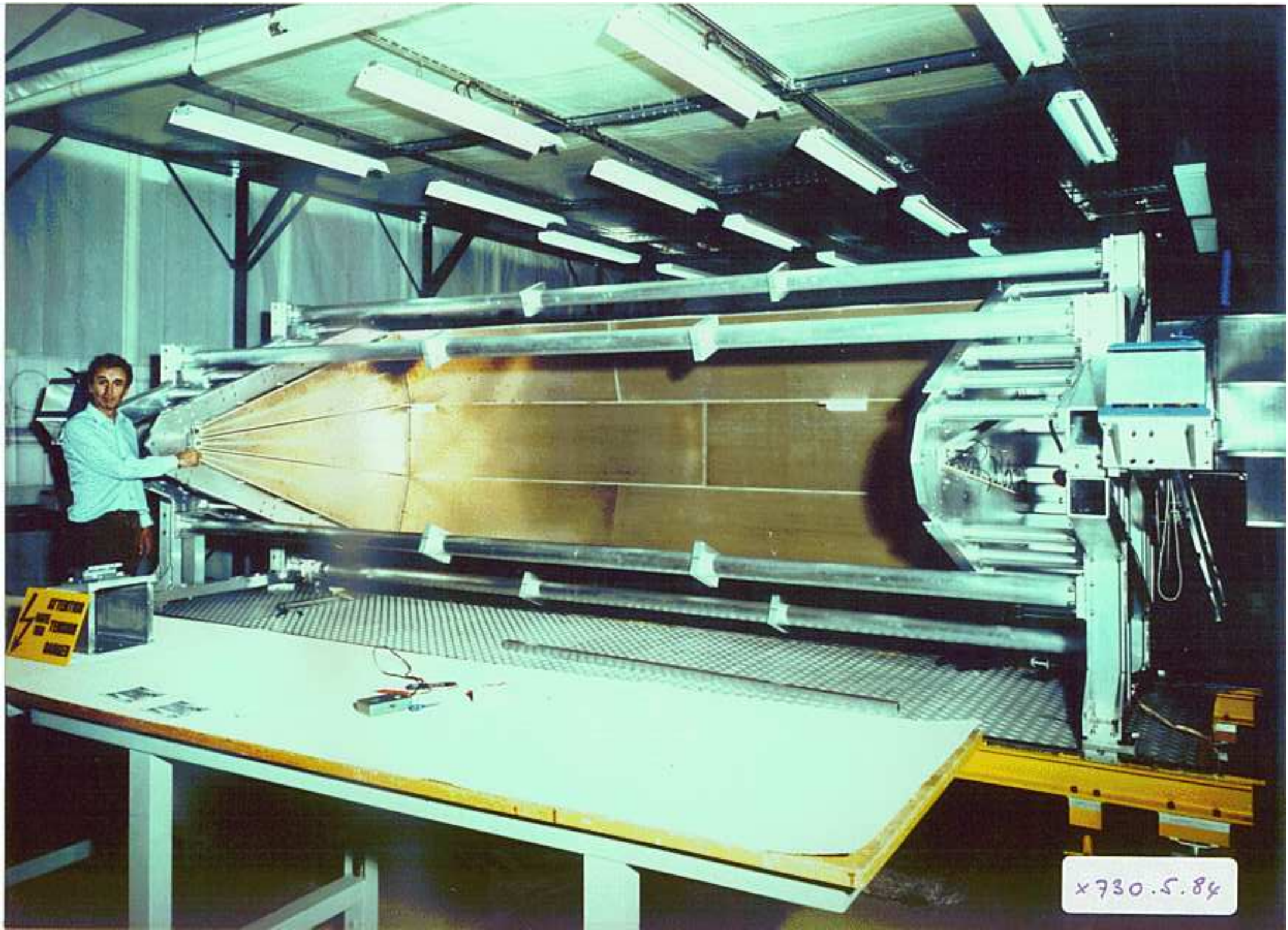
- Workaround:

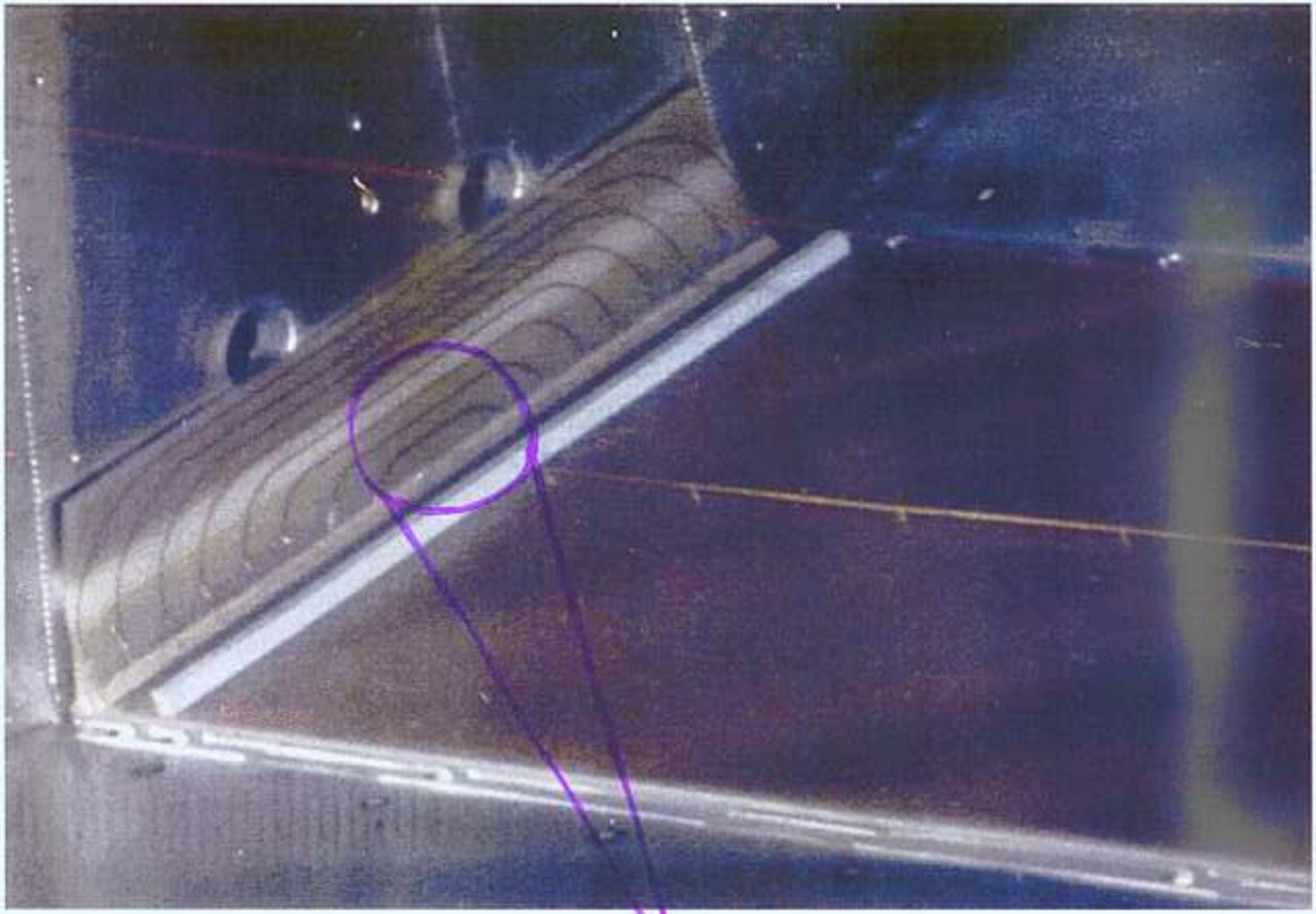
  Voltage/field configuration
  of damaged sector changed

  stable & safe solution concerning
  - electro-static forces (wire movements)
  - strength of surface fields

  → no loss of efficiency (all wires efficient)

  HUGE field distortions

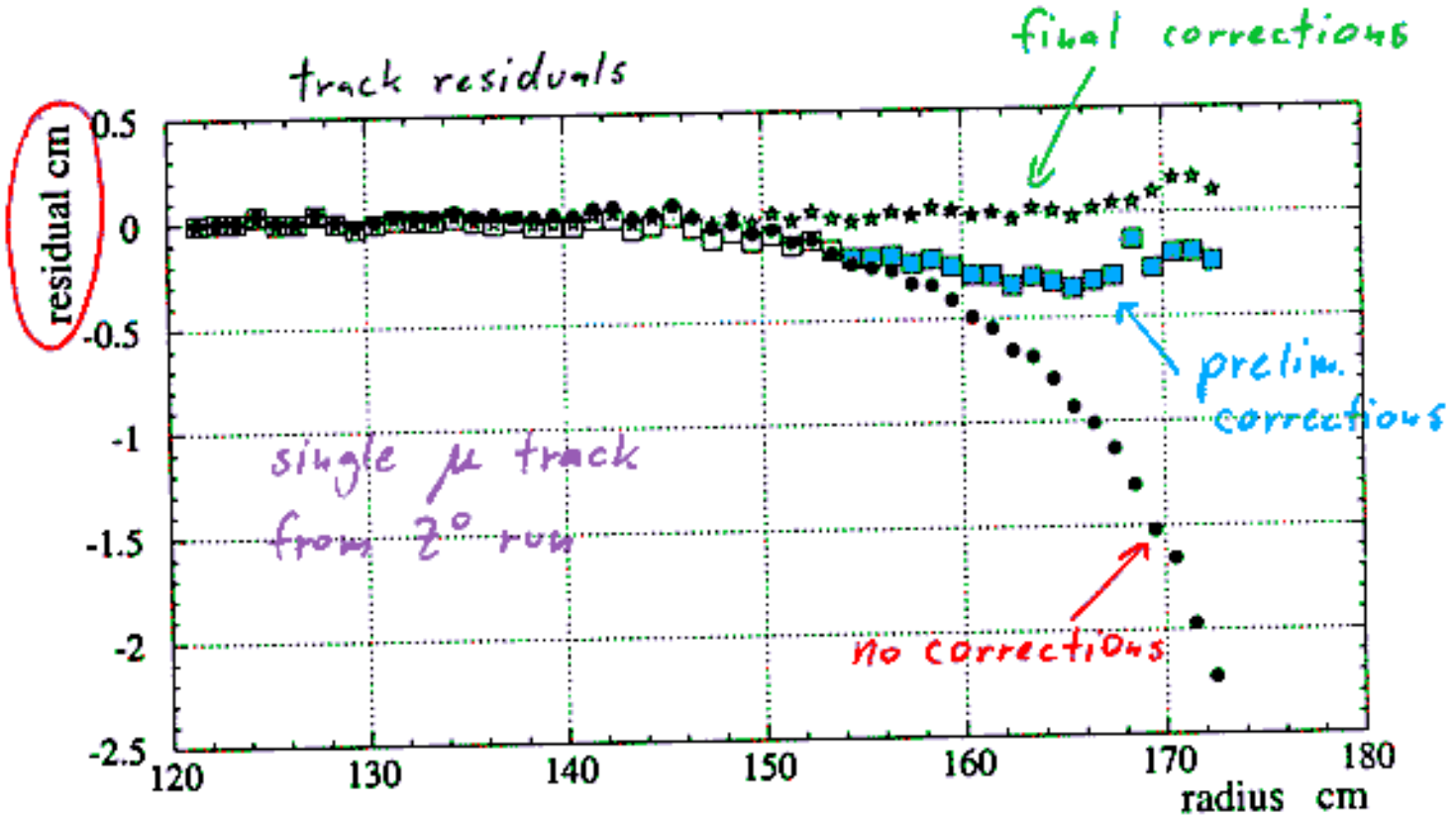

x730.5.84


damaged region
(most likely)

Field Distortions

- Up to ~ 2.5 cm (!) distortions expected
  (> 100x single hit rφ resolution) ↑ from field calculations

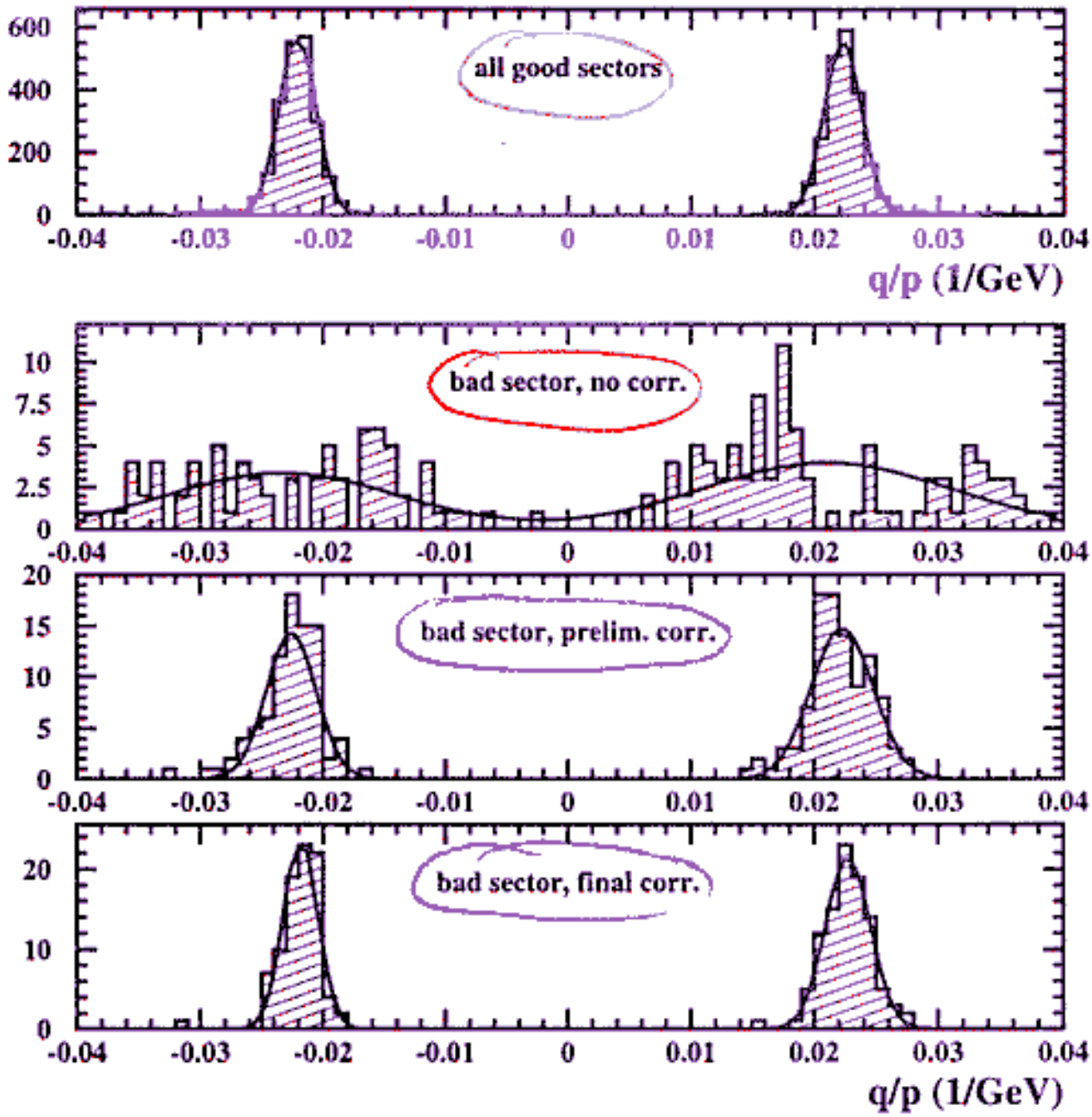
confirmed by cosmics & laser calibration runs before LEP start



- Correction developped based on
  - field calculations
    ↳ prelim. corrections (used for summer conf.)
  - & use of Z° data
    ↳ final corrections (→ Nov. LEPC)

Corrections

momentum resolution, Z^0 run, μ-pairs



Corrections work well
invisible to physics analysis
(also verified with other quantities, e.g. K^0 mass)

Statistics

- Data collected (as of Sep 6)

	Luminosity (pb^{-1})		
E (GeV)	recorded	delivered	efficiency (%)
192	29.64	32.62	90.9
196	77.83	84.46	92.1
200	41.18	45.84	89.8
total	148.65	162.93	91.2

(1998 efficiency: 90.2%)

- Losses:

r/o deadtime: 3.7 %

det. ramp up: 1.9 %

HV trips: 1.0 %

other: 2.2 %

mainly intermittent DAQ problems after power cuts

constant loss per fill:

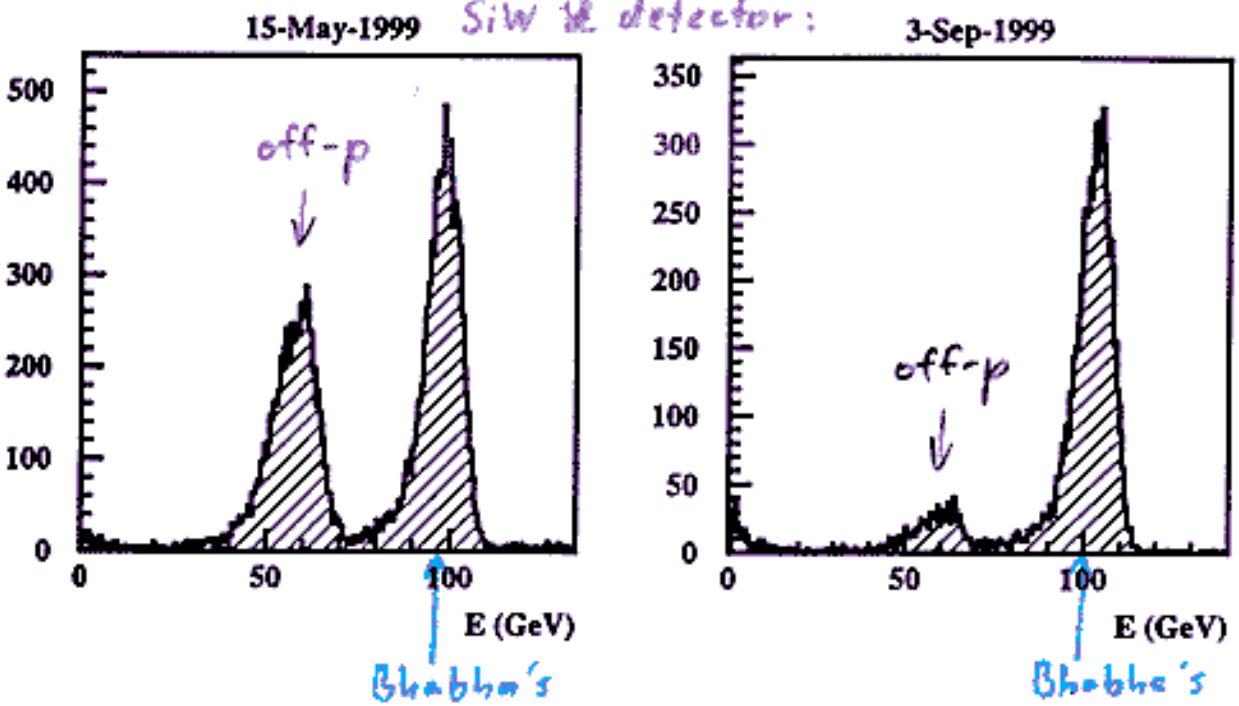
det. ramp up time ~ 3 min (~ 8 nb^{-1}) after collimators in physics settings

shorter fills → more losses (~ 380 fills)

Backgrounds

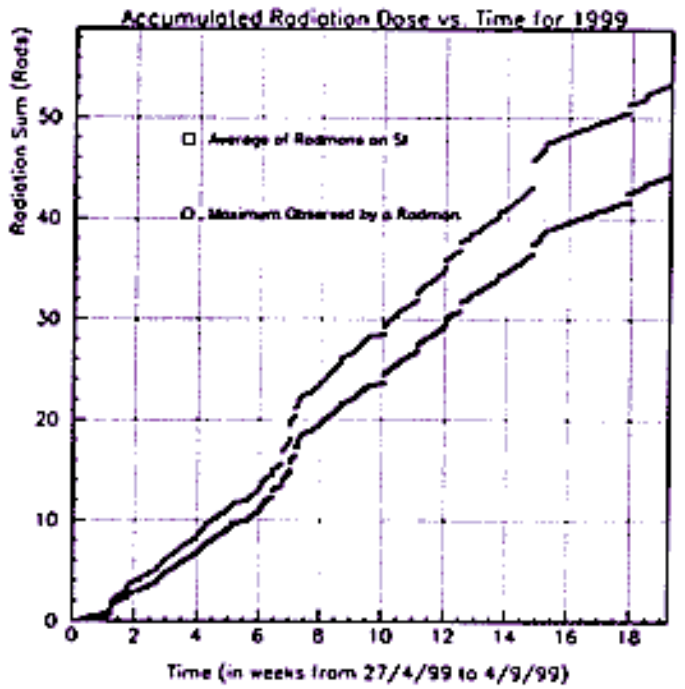
- General background situation fine
  only larger off-p background after LEP start
  (worse vacuum)

SiW detector:



→ largely reduced after few weeks ✓

- Accumulated rad. dose by Si-Vtx detector



← ~ 54 rads max

← ~ 44 rads average
(1998: 66 rads)

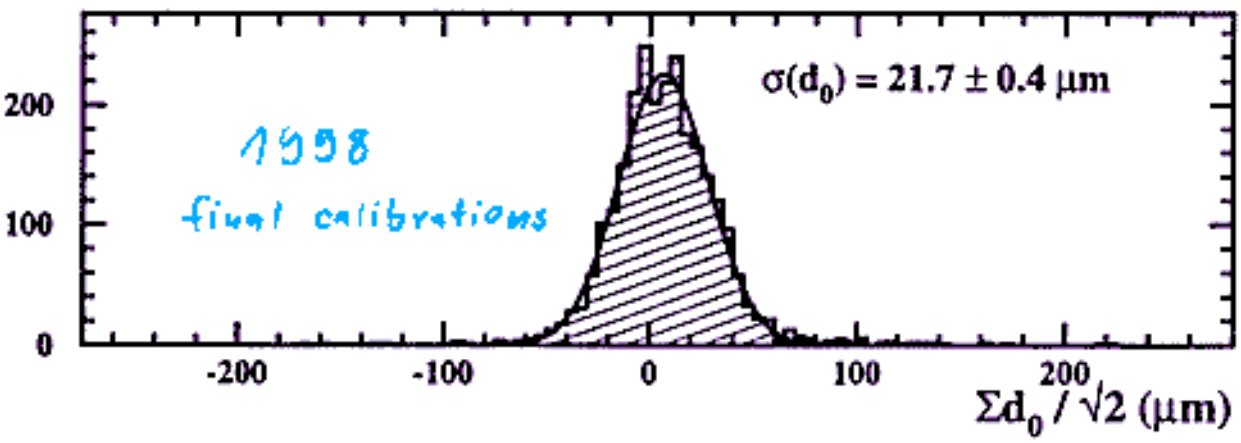
↓

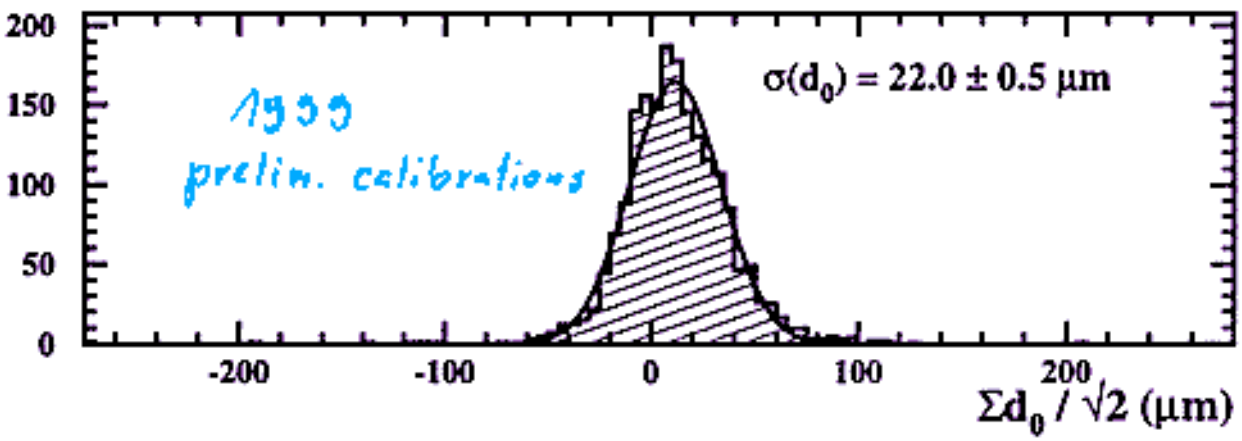
Similar or
less than 1998

Data Quality

- Would we see (miss ?) the Higgs ... ?

Impact parameter ($r\varphi$) distributions from multi hadron & μ-pairs + Bhabha's:

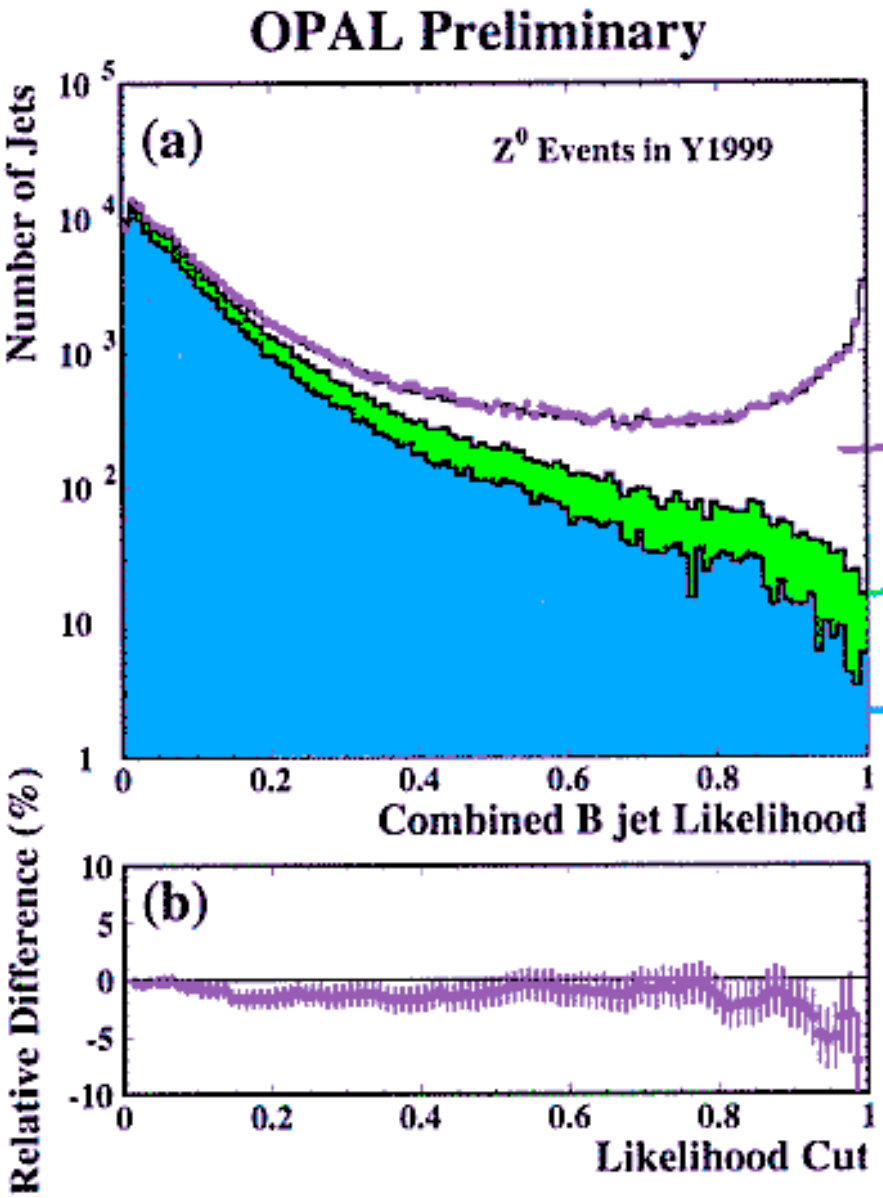




resolutions for
1998 (final calibrations)
+ 1999 (prelim. calibrations)
identical

B-tagging

- B-tagging by combined likelihood of
  - high p_T lepton tag
  - lifetime (displaced vertices + impact parameter NN)
  - jet kinematics (∢ spericity axis – jet axis, # of energy flow objects NN)



Z° cal. run 1999

b jets

c jets

uds jets

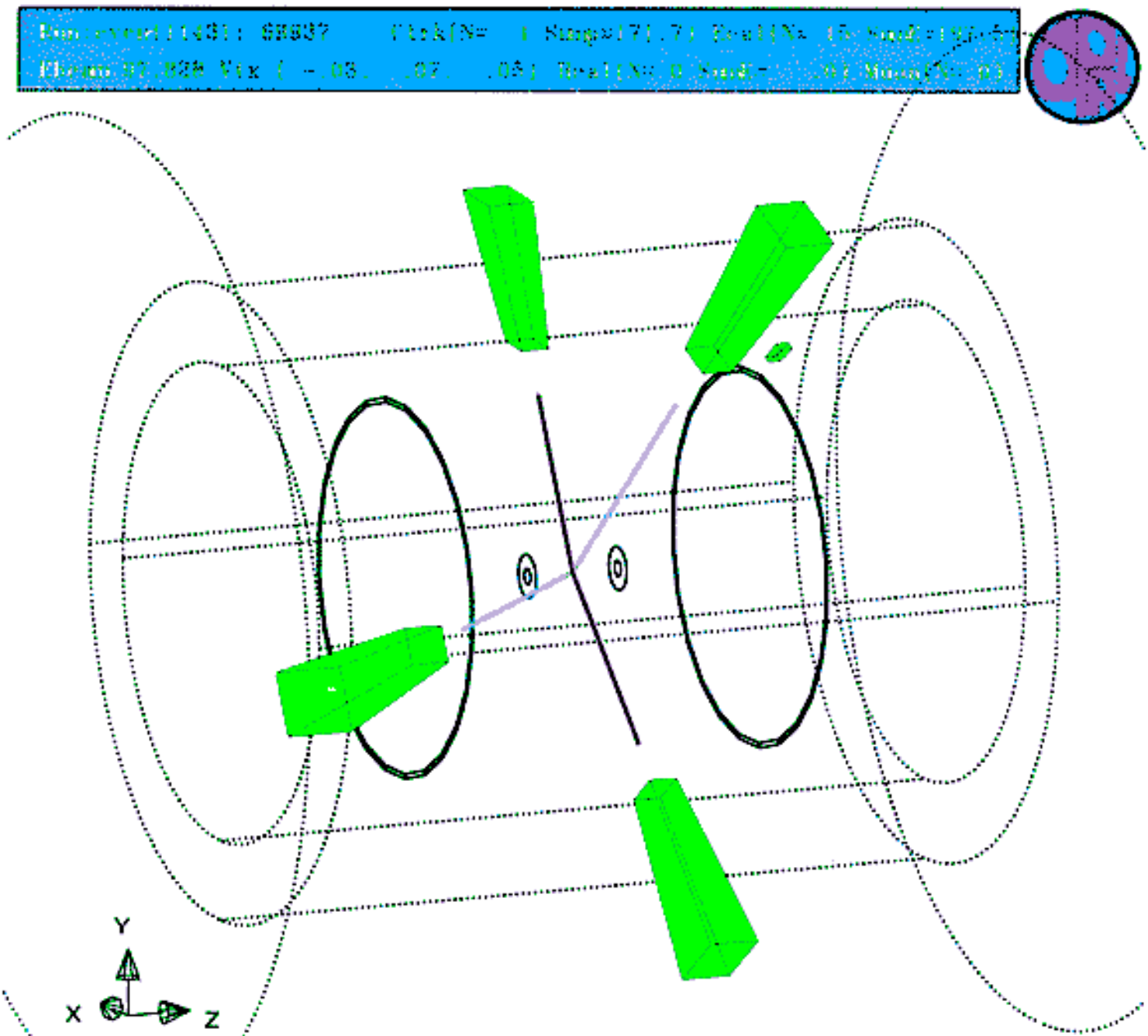
max. difference data – MC ~ 5%

slightly worse than 1998 (still prelim. calibrations used)

El.-magn. Calorimeter

- Excellent detector hardware status :
  - barrel : no broken photo tube (out of 9440)
    - ➔ never ever any tube broken since installation in 1989
  - endcap : 4 broken channels (partially to be recovered)

Bhabha resolution @ 45 GeV : 2.8 % (same as in prev. years)



$ZZ \rightarrow e^+e^-e^+e^-$ candidate

LEP running during rest of 1999

(assume to get permission > 100 GeV/beam soon)

- Continue at 200 GeV until
  enough RF gradient reached
  for safe running at 202 GeV
  (with 1 klystron safety margin)

  ↪ then go to 202 GeV
  (provided $\mathcal{L}$ not $< 1\,pb^{-1}$/day on average)

- No need for Z^0 running

- Possible extension into two reserve weeks:

  - if LEP running at 202 GeV

    ↪ two weeks extension would add
    significant amount of $\mathcal{L}$ at 202 GeV

  - if LEP running at 200 GeV

    ↪ encourage MD on higher energies
    + accumulate more $\mathcal{L}$ at 200 GeV
    in two weeks extension

  ↪ an extension of two weeks is
  strongly favoured in any case

Analysis after LEP shutdown

- Request to be able to continue data analysis with existing tools until 2006
- Need essential analysis tools as now
  CERNLIB, ZEBRA, F77, PAW, PATCAY, FATMEN, GPHIGS
- Data should stay in same format (ZEBRA)
  IT should handle copy to new media as required
- Assume HP-UX + SHIFT (SGI) will be supported to 2003 + replaced then by new platforms
- Agree with LEPC + CERN management on needs to continue upgrade of desktop equipment

  ↳ currently introducing LINUX on PC platforms for OPAL desktop use

Summary

- Central jet chamber incident
  before LEP startup
  - spark caused permanent damage (1/24 sectors)
  - workaround with large field distortions but
  - invisible for data analysis after corrections

- Data Quality (with prelim. calibrations)
  similar to last year (with final calibrations)

- If safe running at 202 GeV possible
  with sufficient $\mathcal{L}$
  → 202 GeV
  two weeks extension strongly favoured

- Data analysis until 2006
  need working tools (both S/W + platforms to run on)

→ **Thank You LEP**

... we had to spend lots of Champagne ...