

# Trip to China to select students, November 1978





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Training lectures at the Institute of High Energy Physics, Beijing



Shanghai

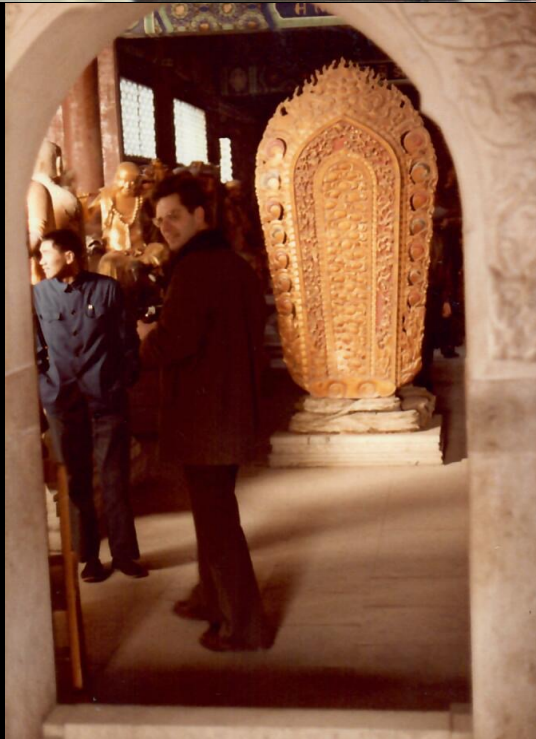


Guilin





# Trip to China to select students, November 1978



Hangzhou





Visit of the Chinese Academy of Science delegation to MARK-J after Gluon discovery





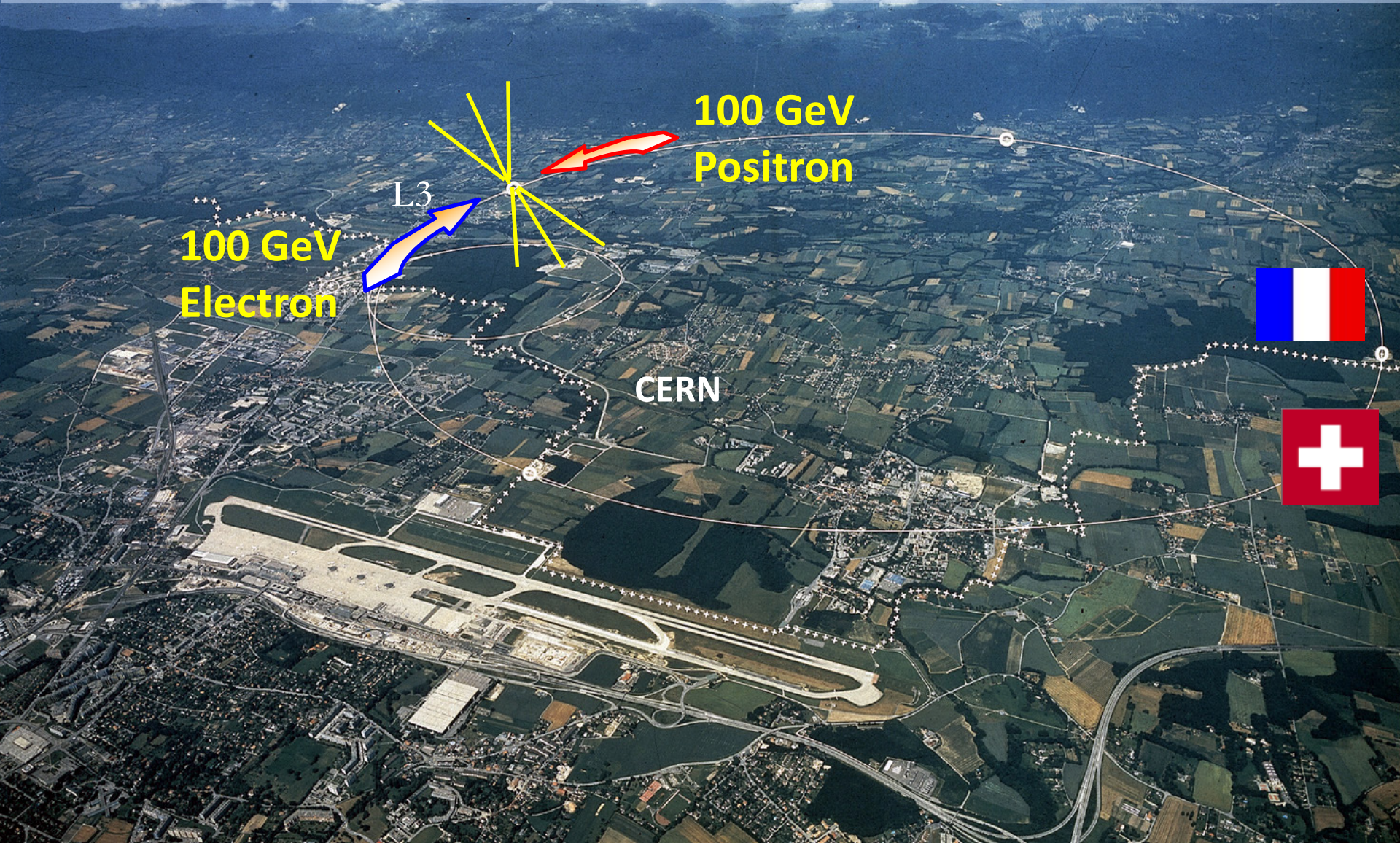


Happy result from MARK-J. The wedding of Dr. Robert Clare and Frl. Ingrid Schulz.



# 1982, Fifth Experiment with Ulrich Becker

## L3 Experiment at CERN (1982-2003)



With the strong participation from with Ulrich Becker, Christoph Paus, Peter Fisher, Bolek Wyslouch



# L3 Experiment: First large international collaboration between 20 countries including United States, Soviet Union, China(Taiwan), and Europe.

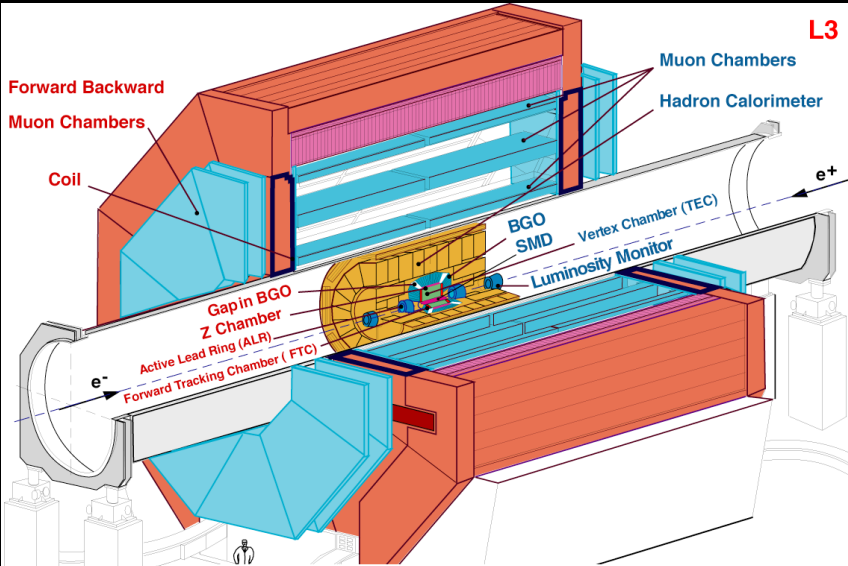


Figure 1: The L3 detector and the Phase-I upgrades shown in red on the drawing

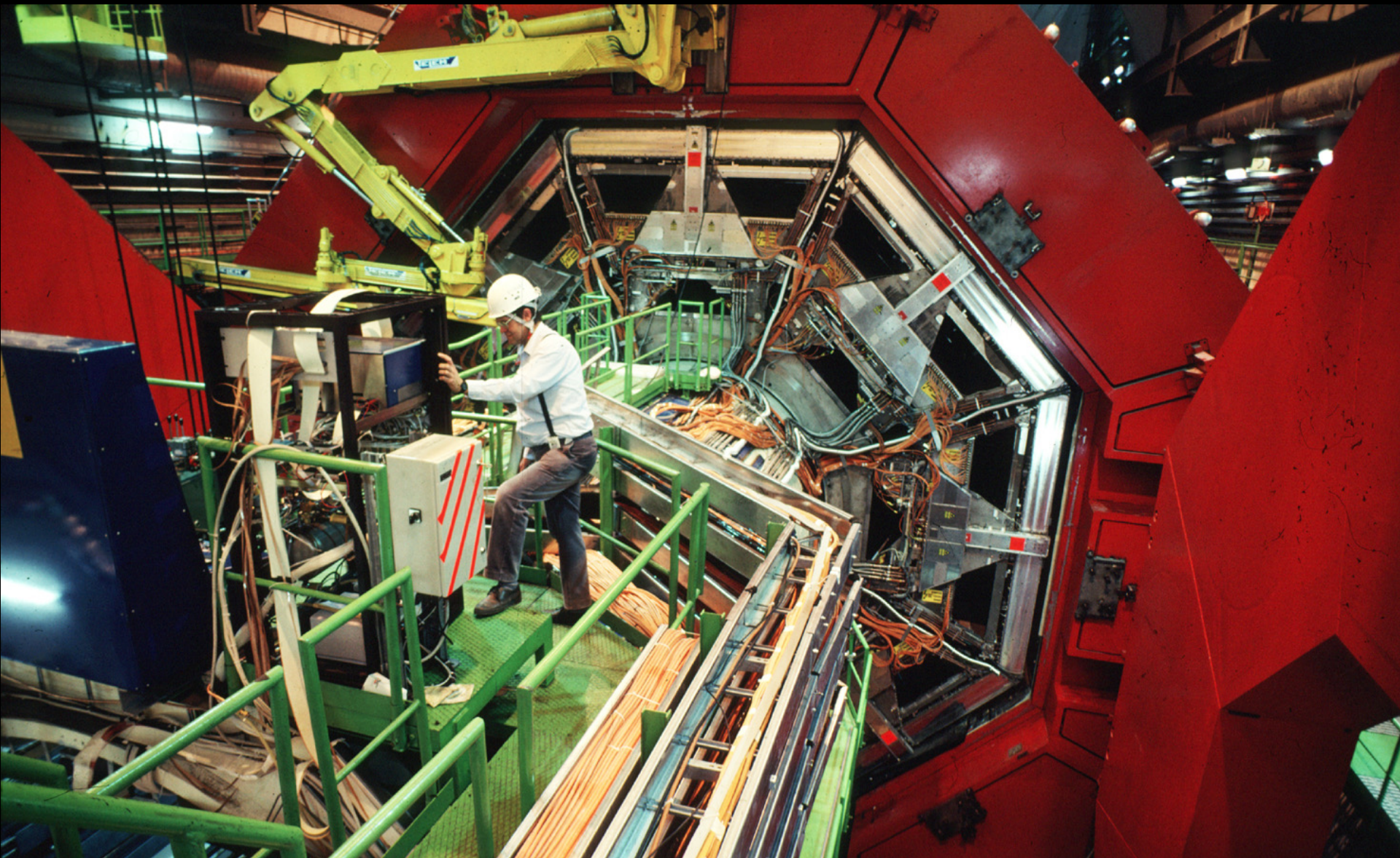


L3 Collaboration





# The L3 muon system was developed and led by Ulrich Becker



A partial list of Ph.D. Students : Torre Wenaus, Jianming Qian, Andre Rubbia.



## STUDY OF RESOLUTION FOR A LARGE ARRAY OF DRIFT CHAMBERS

Ulrich BECKER

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Three drift chambers arranged to represent the cross section of the LEP L3 muon detector were used for track measurements. Displacing the middle chamber by 3.8 mm, corresponding to the sagitta of a 45 GeV muon in 5.1 kG, measurements with UV laser tracks 3 m long yield an equivalent momentum resolution of 1.5%.

## 1. Introduction

Momentum analysis of particles up to 100 GeV will be required in interactions of the new generation of accelerator-colliders. Good resolution is the figure of merit for telescopes and microscopes as well as for storage ring detectors, and depends on the analyzing power  $Bl^2$  of the magnet and the spatial resolution of the chambers. Large  $Bl^2$  demands either operation of drift chambers in very high fields [1]  $B$ , or, more effectively, a long analyzing path  $l$ . The L3 detector [2] shown in fig. 1 analyzes with  $B = 5.1$  kG over  $l = 3$  m. The sagitta of a 45 GeV muon is

$$S = l^2/8\rho = 3.8 \text{ mm},$$

where  $\rho$  is the magnetic bending radius. A 2% momen-

tum measurement hence corresponds to 72  $\mu\text{m}$  spatial accuracy.

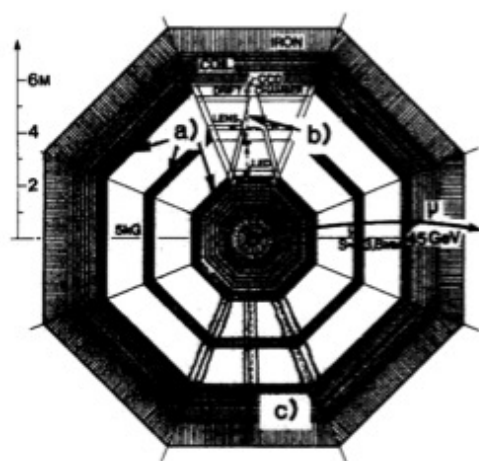


Fig. 1. End view of the L3 detector: a) muon chambers; b) array stand structure with optical straightness monitor; c) channels for UV laser alignment, schematic.

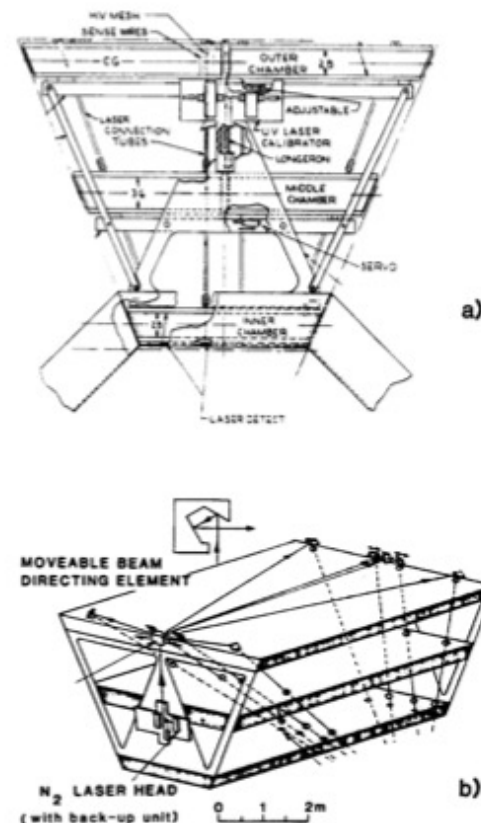


Fig. 2. a) Octant end view, indicated are correction servos and UV laser; b) UV laser test rays through one octant.



## Construction of L3 Muon Chamber



Marion White



Bolek Wyslouch

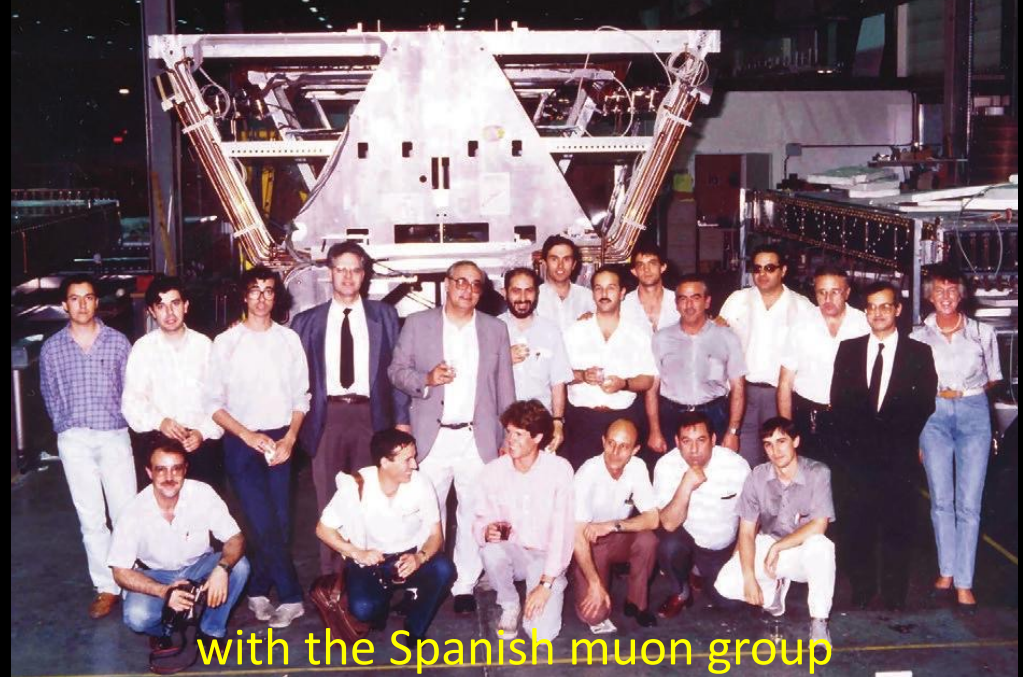




L3



Mike Capell, Ulrich Becker,  
Zhou Bing, Bolek Wyslouch,  
Ernie Moniz



with the Spanish muon group



during the installation



# Author list of the paper “Study of theta inclined tracks in L3 muon chambers”, N.I.M . A 290 (1990) 115-121.

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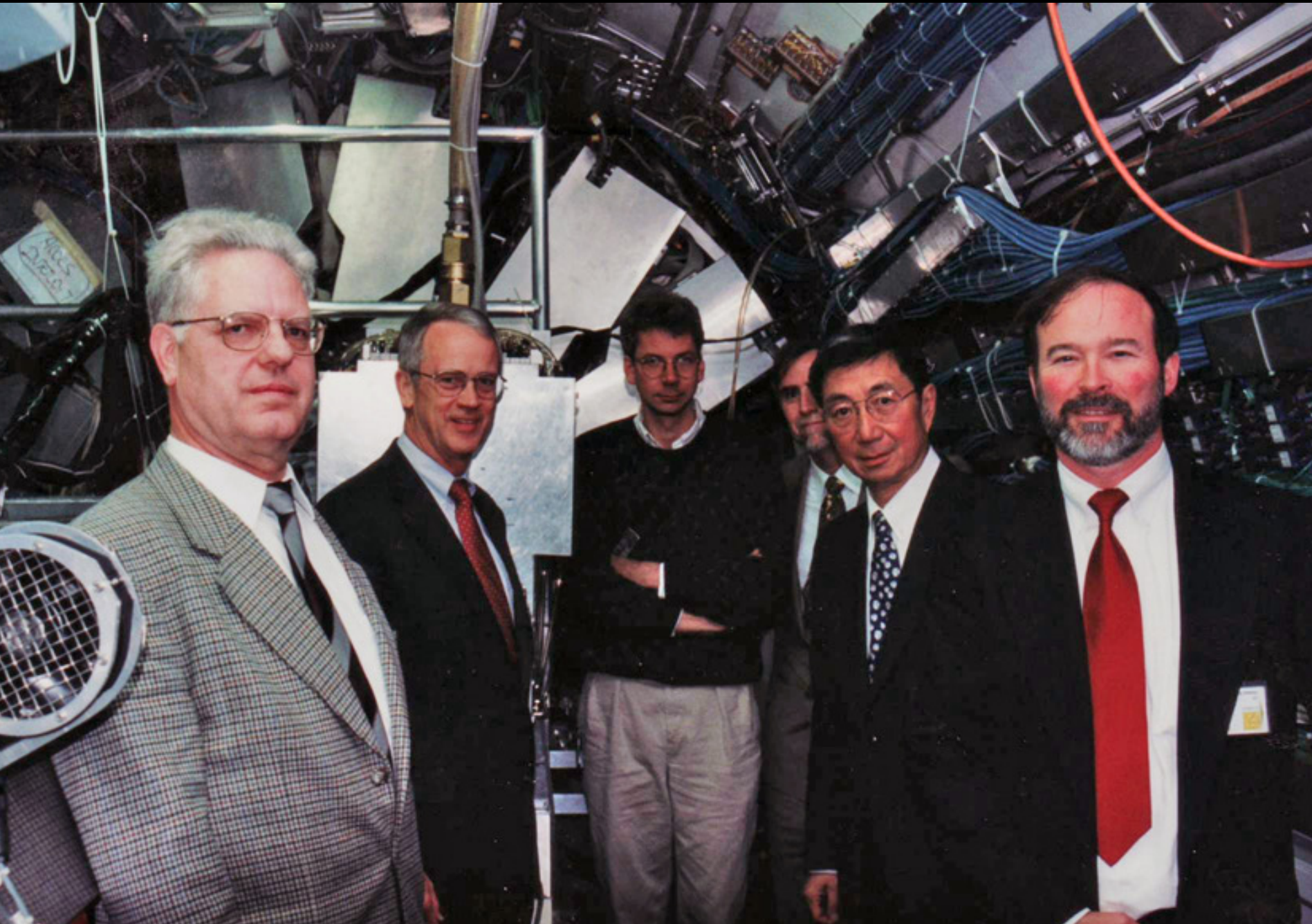


**Ulrich Becker and part of the L3 Muon Chamber group**





**Ulrich Becker, Chuck Vest, Peter Fisher, Bob Redwine visiting L3**





## 1986: 10-year celebration at MIT of Nobel prize to Richter and Ting

