Recollections

Michel Davier

Remise du Prix André Lagarrigue 2010 LAL 26 avril 2011

I would like to thank the André Lagarrigue Prize Committee for awarding me this prestigious prize. It means a lot to me, even if I feel that my achievements fall quite a bit short compared to the model.

I am very grateful to the Local Committee for their tireless efforts to organize this ceremony and for inviting our distinguished guests. They came from all over the world and I am most thankful to them for taking time away from their busy schedule. I value greatly their friendship.

Thanks to the President of the French Physical Society et to all of you for sharing this moment with me.

In making some final comments I chose not to come back to my modest contributions, but I would like to tell you about my beginnings and to recall briefly the important persons who shaped my future.
It turns out that André Lagarrigue had an essential role in this.

My first encounter with particle physics: Nucleus magazine January 1961

Les particules étranges

par A. LAGARRIGUE

Maître de conférences à l'Ecole polytechnique

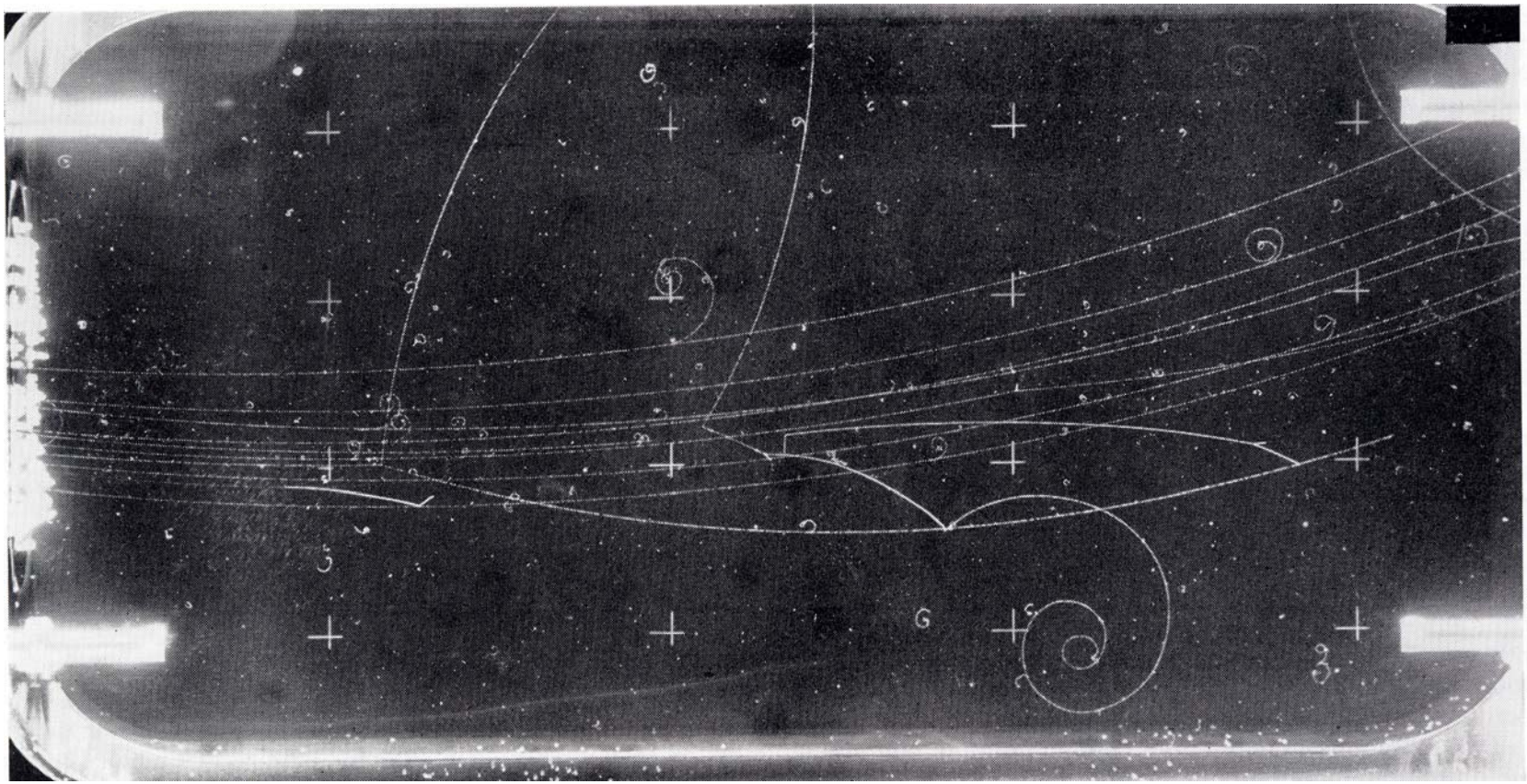
André Lagarrigue *est né en* 1924 *à Aurillac. Il fit ses études aux lycées de Pau et Toulouse. Entré à l'Ecole polytechnique en* 1945, *il en sortit ingénieur à la Direction des études et fabrications d'armement. Il fut détaché très tôt à l'Ecole polytechnique, au Laboratoire du professeur* Louis Leprince-Ringuet *qui avait su développer sa vocation de physicien.*

Jusqu'en 1954 *il se consacra à l'étude des rayons cosmiques dans les laboratoires de montagne. Il fit notamment partie de l'équipe du pic du Midi de Bigorre qui apporta une importante contribution à l'étude, alors toute nouvelle, des particules étranges.*

Ensuite à l'Université de Berkeley en Californie où l'accélérateur de 6 *milliards de volts venait d'entrer en service, il se forma à de nouvelles techniques.*

Depuis, revenu à l'Ecole polytechnique, il dirige le groupe des chambres à bulles à liquides lourds. Sa chambre à bulles constitue à l'heure actuelle l'un des moyens d'expérimentation les plus puissants du C.E.R.N. (Organisation européenne de la recherche nucléaire) à Genève, auprès de l'accélérateur de 25 *milliards de volts.*

in this paper:



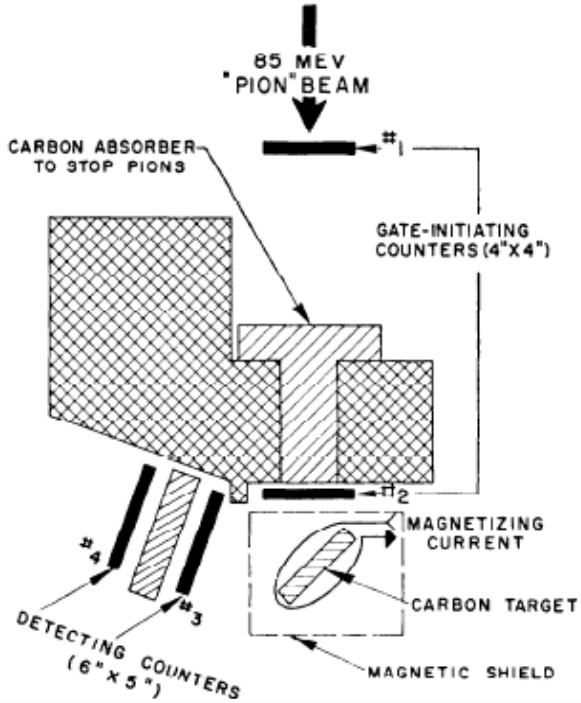
Picture taken with the BP3 bubble chamber (on display in front of Bat. 208), built by A. Lagarrigue and exposed to a pion beam at Saturne (Saclay)

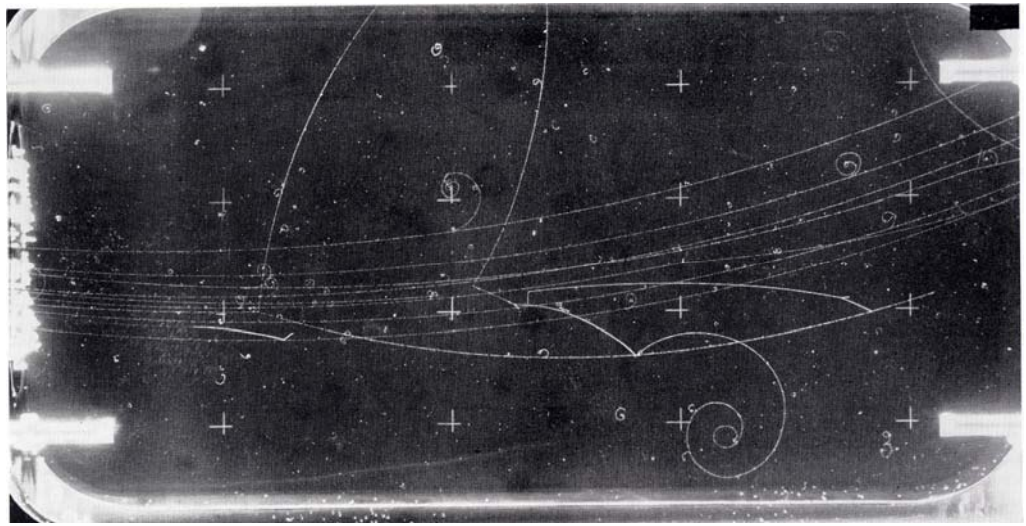
$\pi^- p \rightarrow K^0 \Lambda$ $\quad K^0 \rightarrow \pi^+ \pi^-$ $\quad \pi^- \rightarrow \mu^- \bar{\nu}_\mu$ $\quad \mu^- \rightarrow e^- \bar{\nu}_e \nu_\mu$ $\quad \Lambda \rightarrow p \pi^-$

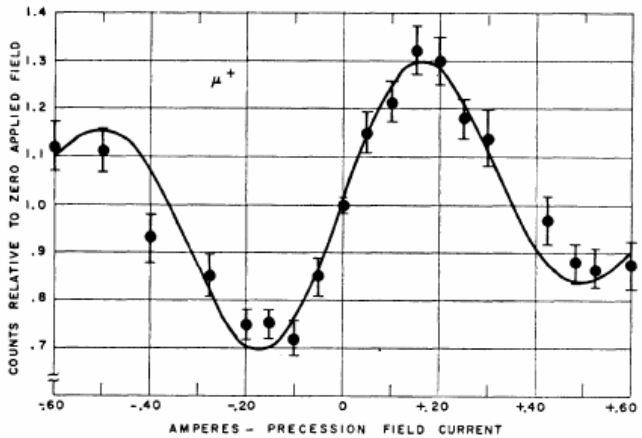
André Lagarrigue

- 1961: article in Nucleus
- 1965-66: my particle physics professor in DEA Physique Théorique (graduate school)
- physics made lively and exciting (exp. Garwin-Lederman-Weinrich)
- 1969: worries for my thesis defence (LLR)
- 1970: friendly debate with Panofsky concerning my departure to Stanford (free market)
- correspondence: neutrinos vs. electrons
- 1973: Aix-en-Provence and Bonn conferences: discovery of the neutral currents
- 1975: shocking news of André Lagarrigue's sudden death
- my return to Orsay on AL's professor chair
- continuing AL's courses for pre-medical students
- greatest honour for me to be awarded the André Lagarrigue Prize

Garwin-Lederman-Weinrich experiment (1957)







$\pi^- \rightarrow \mu^- \bar{\nu}_\mu \qquad \mu^- \rightarrow e^- \bar{\nu}_e \nu_\mu$ weak interaction

P violation ?

P violation ?

μ polarised → e direction correlated with μ spin

+

μ spin (magnetic moment) precesses in magnetic field

electron rate varies with applied B field

Another early reading:

Réalités magazine June 1963

“L’université aux 17 Prix Nobel” (Caltech)

gave me a glimpse of frontier science and first-rate research /teaching

fascinating picture (R. Feynman): the respectful, but friendly relationship between professor and student

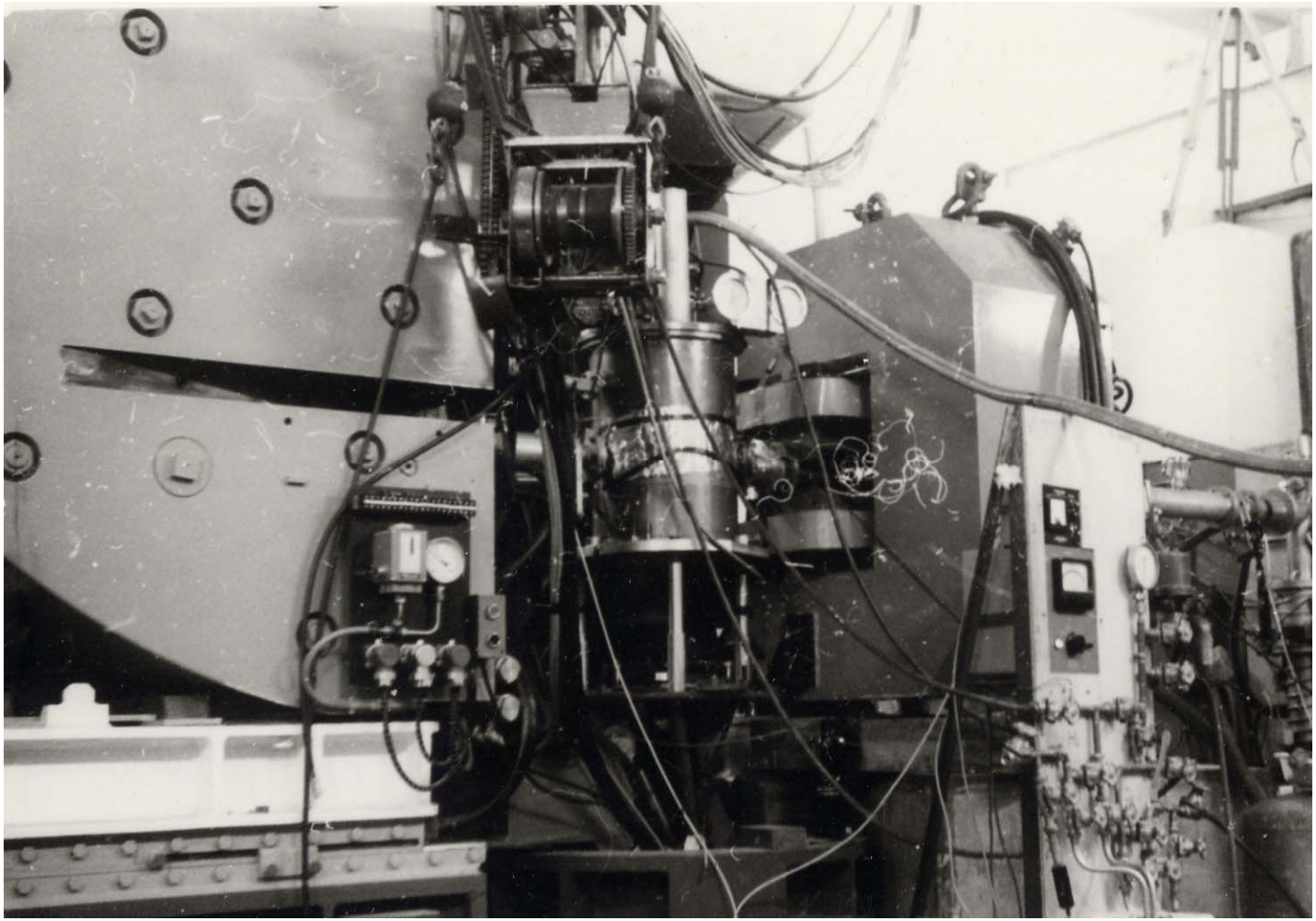
I want to do particle physics!

Darrell Drickey

- 1963-64: post-doc in P. Lehmann's group at LAL, after a PhD in Stanford (HEPL)
- he proposed the subject of my undergraduate thesis and supervised my work
- great enthusiasm and experimental know-how
- communicative optimism
- my first paper (Phys. Rev.)
- introduced me to SLAC later for my PhD
- moved on to UCLA; pioneered collaboration with Russia; SC magnet R&D at FermiLab
- remained close friends
- 1974: untimely death

- my tutor who brought me up as an experimentalist

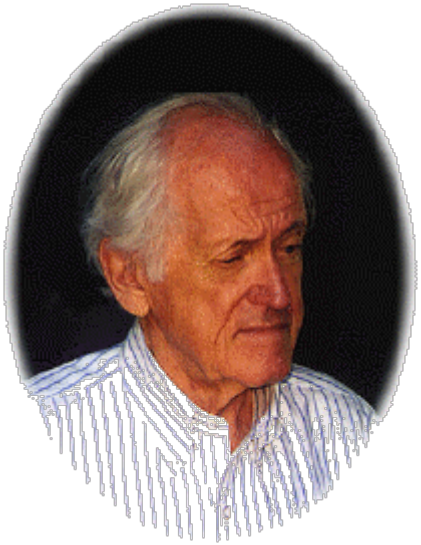
My undergraduate diploma experiment (1964)



$\gamma\, d \rightarrow \pi^0\, d$ radiator, magnet, liquid D_2 target, spectrometer, 2 scintillators scalers, pulse-height analyser (paper output), no computer

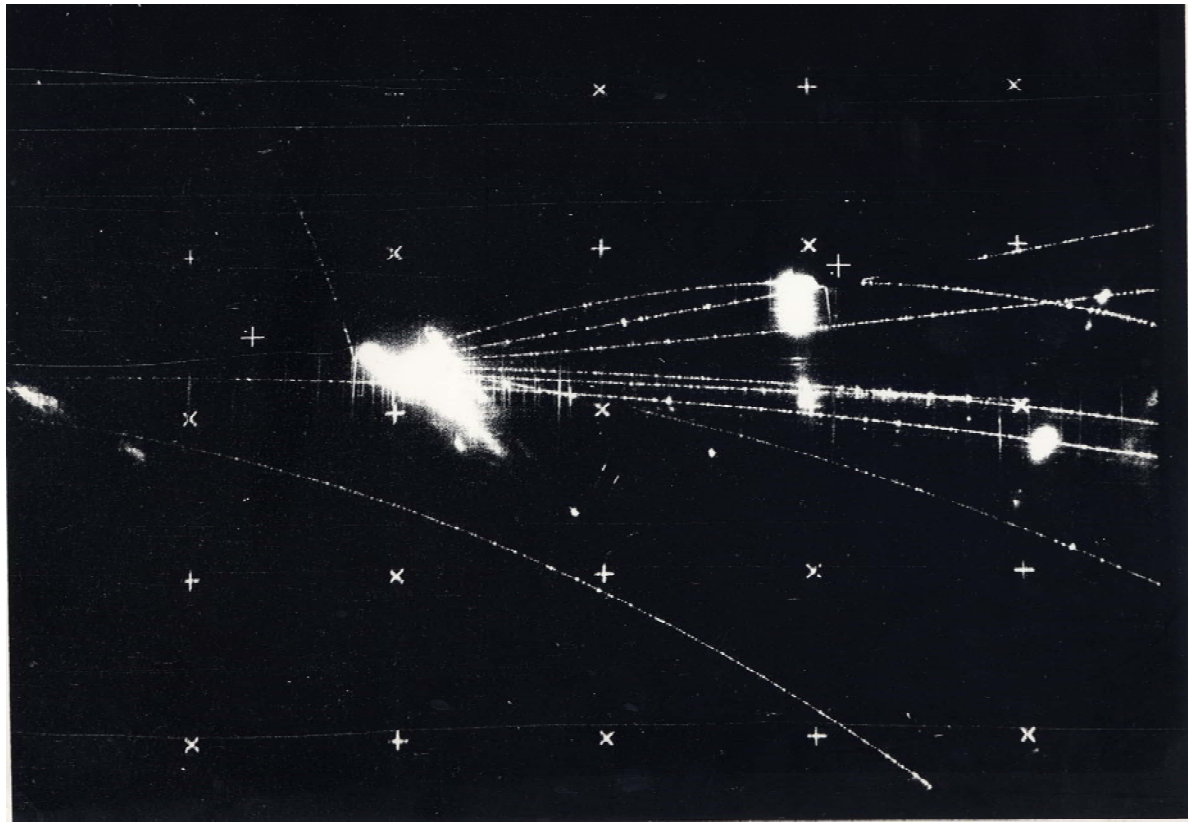
$\Rightarrow$ tremendous opportunity to learn the experimental trade

PhD work at SLAC (1967-68)



- warm welcome in Bob Mozley's group
- impressive streamer chamber and high-energy photons
- friendly vector mesons
- money is short!

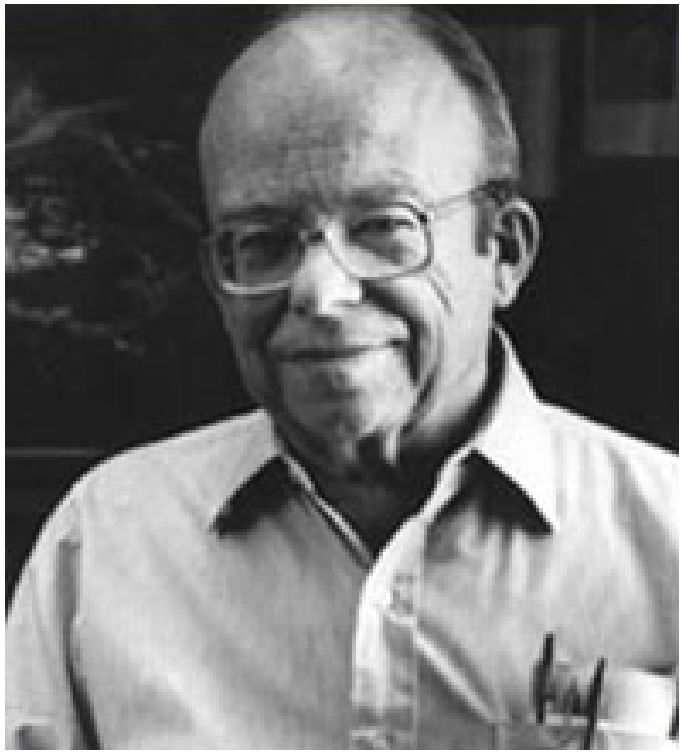
- Bob invited me back in Summer 1969
- the good (ρ(1700)) and the bad



André Blanc-Lapierre

- LAL director (1961-1969)
- distinguished mathematician and physicist
- recruited me before my PhD as ‘teaching assistant’
- respected authority, great wisdom, fatherly figure
- Ecole Normale Supérieure vs. Ecole Polytechnique: A. Blanc-Lapierre and L.Leprince-Ringuet
- “his grand-grand-son”
- the pleasure to meet him again at the Academy of Sciences (1996)

Pief Panofsky



- founder and SLAC Director
- through his vision SLAC produced 3 Nobel Prizes in particle physics
- a brilliant intelligence behind a smile
- science and policy: world expert on arms control and adviser to several US Presidents
- showing interest to anyone, no matter the level

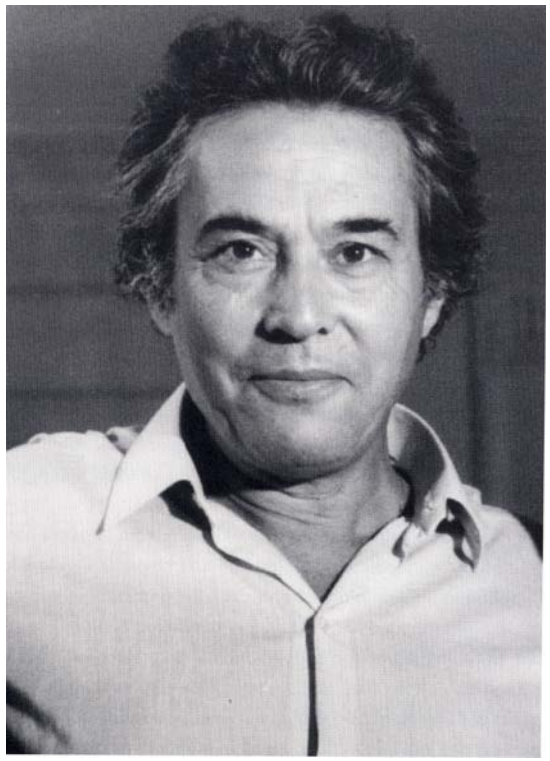
- hired me on the SLAC Faculty in 1970
- greatest place for physics in the 70's
- tenured professor appointment and problems with Immigration
- great understanding when I left in 1975
- my model of a lab director
- many interactions with him about particle physics in China (father of BEPC)

David Leith

- my older brother at SLAC
- 5 years of exciting work together on hadron physics
- friendly and lively exchanges
- enjoyable atmosphere in Group B
- unforgettable evening seminars at David&Doreen’s home
- a true Scottish gentleman and a lasting friend

Pierre Lehmann

- gave me strong support since my undergraduate thesis and my PhD
- initiated LAL participation in ‘electronic’ experiments at CERN
- my first real involvement at CERN in 1969-70
- bright, quick, constant flow of ideas, vision
- grateful for his trust: my return from the US, LAL directorship
- introduced me to many key people: Ph. Meyer, G. Charpak, …
- rich and charming personality, the pleasure of talking about music



I have been fortunate to start my scientific life with such models.
It is sad that over the years most of them have passed away.
I miss them very much.

A few comments

- most of my activities in the last 40 years have been so kindly covered by the previous speakers
- I have thoroughly enjoyed working in particle physics
- I tried to contribute in different ways: teaching, training students, doing research, managing, advising
- the creative process of launching a new experiment with collaborators and engineers was always very stimulating

- we belong to a truly worldwide community with wonderful opportunities
- the equipments we build are at the technology frontier
- we are asking the most fundamental questions on matter and the universe

- at present the LHC is bringing fantastic opportunities for opening new windows
- further advances will require a large electron-positron linear collider for which we have a project
- the longer term future of high energy physics is still a challenge and will require new ideas

A vision of research

- what I enjoyed most has been doing research analyzing experimental data

- is it possible to contribute to this “big-time physics” as Darrell used to put it, while keeping human-size interactions--- the student-professor relationship which fascinated me 50 years ago ?
- I have tried to follow this model with my students and postdocs
- there was a renewed pleasure to involve them at the research forefront, to share knowledge with them, to explore together terra incognita (physics, but detector performance most of the time), yet to be always scientifically competitive
- this has been a very demanding, but rewarding approach
- essentially all my research in the last 30 years has been done in this way

- I owe many thanks to my students/postdocs for these exciting moments !

Many thanks to all of you !