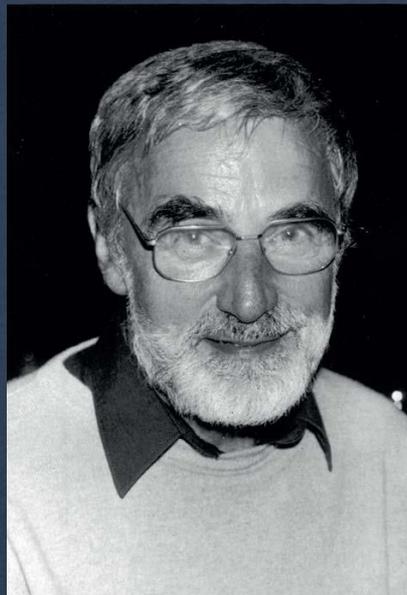


*In Memoriam:*

# *Dieter Möhl*

*His life as scientist, mentor and friend*

*1936 - 2012*



# The early years



- œ Born 1936 in Münster, Germany
- œ Stayed during WW2 in several “safe” places in the “Sauerland” with relatives and moved with the age of 16 to “Recklinghausen” where he did his “Abitur” shortly after
- œ Studies of Physics from 1957 – 1966 at
  - œ “Technische Hochschule Braunschweig” (April 1957 – March 1960) graduated as “Vordiplom” ( $\hat{=}$  Bachelor)
  - œ “Technische Universität Berlin” (March 1960 – December 1960)
  - œ “Freie Universität Berlin” (December 1960 – December 1963) graduated as “Physik Diplom” ( $\hat{=}$  Master of science)

# The early years



- œ “Freie Universität Berlin” employed as “Wissenschaftlicher Assistent” ( $\hat{=}$  assistant lecturer) from January 1964 – July 1966
  - œ **Work as assistant lecturer:** Participation in the design of a 150 MeV FFAG electron accelerator. Model tests, design and construction of RF-systems. (Supervisor: Prof. Dr. Hans Lassen)
  - œ **PhD thesis:** Untersuchungen zur Breitbandanpassung von Beschleunigungselektroden bei Teilchenbeschleunigern (Broadband matching of accelerator electrodes in particle accelerators)

# 35 years @ CERN...

## a long way to go

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01.11.1966	31.12.1984	ISR-300/GS
01.01.1985	30.06.1985	PS-LEA
01.07.1985	30.06.1986	PS-LEA
01.07.1986	30.06.1987	PS-LEA
01.07.1987	31.12.1987	PS-LEA
01.01.1988	30.06.1988	PS-AR
01.07.1988	30.06.1989	PS-AR
01.07.1989	30.06.1990	PS-AR
01.07.1990	30.06.1991	PS-AR
01.07.1991	29.02.1992	PS-AR
01.03.1992	30.06.1992	PS-AR
01.07.1992	30.06.1993	PS-AR
01.07.1993	30.06.1994	PS-AR
01.07.1994	31.12.1994	PS-AR
01.01.1995	30.06.1995	PS-DI
01.07.1995	30.09.1999	PS-DI
01.10.1999	31.01.2000	PS-DI-ST
01.02.2000	31.03.2000	PS-DR-ST
01.04.2000	31.08.2001	PS-AE-PJ
01.09.2001	31.12.2001	PS-AE-PJ

starting with W. Hardt  
as his first supervisor

# Scientific Contributions



- ⌘ Amongst many other highlights, he made outstanding contributions to the refinement of stochastic cooling theory originally invented by Simon van der Meer in 1968 (first published in 1972).
- ⌘ This field of activity is also strongly related to his input to ordered (crystalline) beam theory, electron cooling, Schottky signal theory, polarized beams and beam stability issues.

# Scientific Contributions



- ∞ He was one of the pioneers, who demonstrated by the Initial Cooling Experiment (ICE) that stochastic cooling was a viable proposition. This was essential for the approval of the CERN antiproton programme and its success.
- ∞ Dieter has made important contributions also to electron cooling, a token of this is found in AD and in the modified of LEAR machine which become the Low Energy Ion Ring (LEIR). This machine (LEIR) acts as buffer and accumulation ring between the fast-cycling ion Linac 3 and the slow-cycling PS, an essential element in the LHC ion injector chain.

# Scientific Contributions



- ❧ He was a leading member of the team initiating and designing the Low Energy Antiproton Ring (LEAR) where the first ultra-slow beam extraction extending over hours to the experiments was performed.
- ❧ He was one of the founding fathers of the ion accumulation scheme in LEAR (later LEIR).
- ❧ After the decision to stop LEAR he actively participated in the study and design of a simplified antiproton source which became later the Antiproton Decelerator ring (AD) after the project SUPERLEAR of which he was one of the prominent promoters was not approved.

# Scientific Contributions



∞ With the success of the AD, permitting the deceleration of antiprotons down to very low energies, the concept of a new dedicated machine, the ELENA (Extra- Low ENergy Antiproton) ring, (re)gained momentum. This machine is to be installed in the AD hall (2015) and Dieter was one of the important contributor to this project (ELENA was originally proposed by H. Herr in 1982)

# Scientific Contributions



## Accelerators studied:

- ✧ RCS as injector for 300 GeV synchrotron (with W. Hardt)
- ✧ LBL: e-p studies (with Sessler)
- ✧ CPS & ISR: polarized protons and antiprotons
- ✧ Performance SPS
- ✧ SUPERLEAR
- ✧ Tau-charm factory in Spain
- ✧ B-factory
- ✧ Neutrino factories
- ✧ Various rings at FAIR/GSI

# Dieters Contribution to the Nobel Prize of SvM

## STOCHASTIC COOLING AND THE ACCUMULATION OF ANTIPROTONS

Nobel lecture, 8 December, 1984

by

SIMON VAN DER MEER  
CERN, CH- 1211 Geneva 23, Switzerland

## ACKNOWLEDGEMENTS

The development of the stochastic cooling theory owes much to H. G. Hereward, **D. Möhl**, F. Sacherer, and L. Thorndahl.

## References:

- 3. **D. Möhl**, Stochastic cooling for beginners, Proceedings of the CERN Accelerator School on Antiprotons for Colliding Beam Facilities, CERN 84- 15 (1984).
- 5. **D. Möhl**, G. Petrucci, L. Thorndahl, S. van der Meer, Physics and technique of stochastic cooling, Phys. Reports 58 (1980) 73.

# Awards



- ❧ Oct 2, 2001 US Particle Accelerator School prizes for Achievement in Accelerator Physics and Technology for this year went to Tor Raubenheimer of SLAC, Stanford and Dieter Möhl of CERN. Möhl was honoured for his outstanding contributions to beam cooling and to counteracting intensity limitations, and for his impact on the conception, design and operation of low-energy storage rings for ions and antiprotons. The prizes were awarded at the 2001 Particle Accelerator Conference in Chicago.
- ❧ He also became “Eminent Scientist” of RIKEN, Japan 2002

# Serving as Reviewer



- ⌘ Dieter was serving as a very friendly but strict reviewer in a large number of review committees all over the world – too numerous to be listed here completely
- ⌘ In the frame of these duties he was invited to accelerator labs in Europa, Asia and the US many times since the late 70's
- ⌘ He has also been reviewing a large number of articles submitted by colleagues in virtually all scientific journals relevant to the particle accelerator field

# Theory and Teaching



## ∞ Theory and teaching:

- ∞ Expert of world-wide reputation in stochastic cooling (book by Springer)
- ∞ Ordered beams
- ∞ Electron cooling: study of applications
- ∞ Polarized beams
- ∞ Beam stability

# Dieter Möhl - Teacher par Excellence (1)



☞ Throughout the many years that Dieter was a faithful, very knowledgeable and much appreciated lecturer at CAS, he was always the perfect gentleman, never raising his voice and a very pleasant person to deal with. He was always prepared to give of his time to students. I know that he helped many physicists from the eastern block countries and, for example, took Edil Mustafin under his wing at CERN, starting him off on his career. (Suzanne von Wartburg)

# Dieter Möhl - Teacher par Excellence (2)



- œ CAS events where Dieter gave lectures:
  - œ Geneva 1983 (Antiprotons for Colliding-Beam Facilities)
    - œ Stochastic Cooling for Beginners
  - œ Oxford 1985 (Advanced)
    - œ Stochastic Cooling
  - œ Rhodes 1993 (Introductory)
    - œ Stochastic Cooling (Storage Rings)

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# Dieter Möhl - Teacher par Excellence (3)



- ⌘ Eger 1995 (Intermediate)
  - ⌘ Electron Cooling Stochastic Cooling
- ⌘ Benodet 1999 (Intermediate)
  - ⌘ Sources of Emittance Growth
- ⌘ Loutraki 2000 (Introductory)
  - ⌘ Beam Cooling

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# Dieter Möhl - Teacher par Excellence (4)



- ⌘ Zeuthen 2003 (Intermediate)
  - ⌘ Sources of Emittance Growth
  
- ⌘ Zeegse 2005 (Small Accelerators)
  - ⌘ Transverse Dynamics: Emittances
  
- ⌘ Trieste 2005 (Intermediate)
  - ⌘ Sources of Emittance Growth (Hadrons)
  
- ⌘ Daresbury 2007 (Intermediate)
  - ⌘ Sources of Emittance Growth (Hadrons)

# Advice to Management



“His advice to management was very precious. During the time I had management responsibilities, I often sought Dieter's advice on delicate topics which was objective and frank. I should add that he even performed in administrative duties: Dieter did not like administration. However, when he had to step in and take a responsibility, he assumed it very conscientiously and absolutely reliably. It was also in this field a pleasure to work with him.” (Kurt Hübner)

# Human Right activist Orlov committee



∞ Dieter was not only a famous Accelerator Physicist but played also an important role in Human Rights issues, in particular in the framework of the Orlov Committee created at CERN with him as one of the founding fathers to provide efficient help to Soviet dissidents in the 1970/80s

# After (formal) Retirement



- Retired since 2001, Dieter was nearly every day at work to help us in our projects and to give us advice. Stochastic cooling at the GSI FAIR project profited from his collaboration over several years and so did the bunched-beam simulations for the NICA ion collider.
- Even the day before his untimely death, he was still at CERN to discuss with us the ELENA project.  
(S. Maury)

# Many Thanks to:



☞ Lisa Möhl

☞ M. Chanel, S. Maury, B. Strasser, S. von Wartburg,  
L. Thorndahl, K. Hübner, H. Koziol, C. Carli and many  
others