

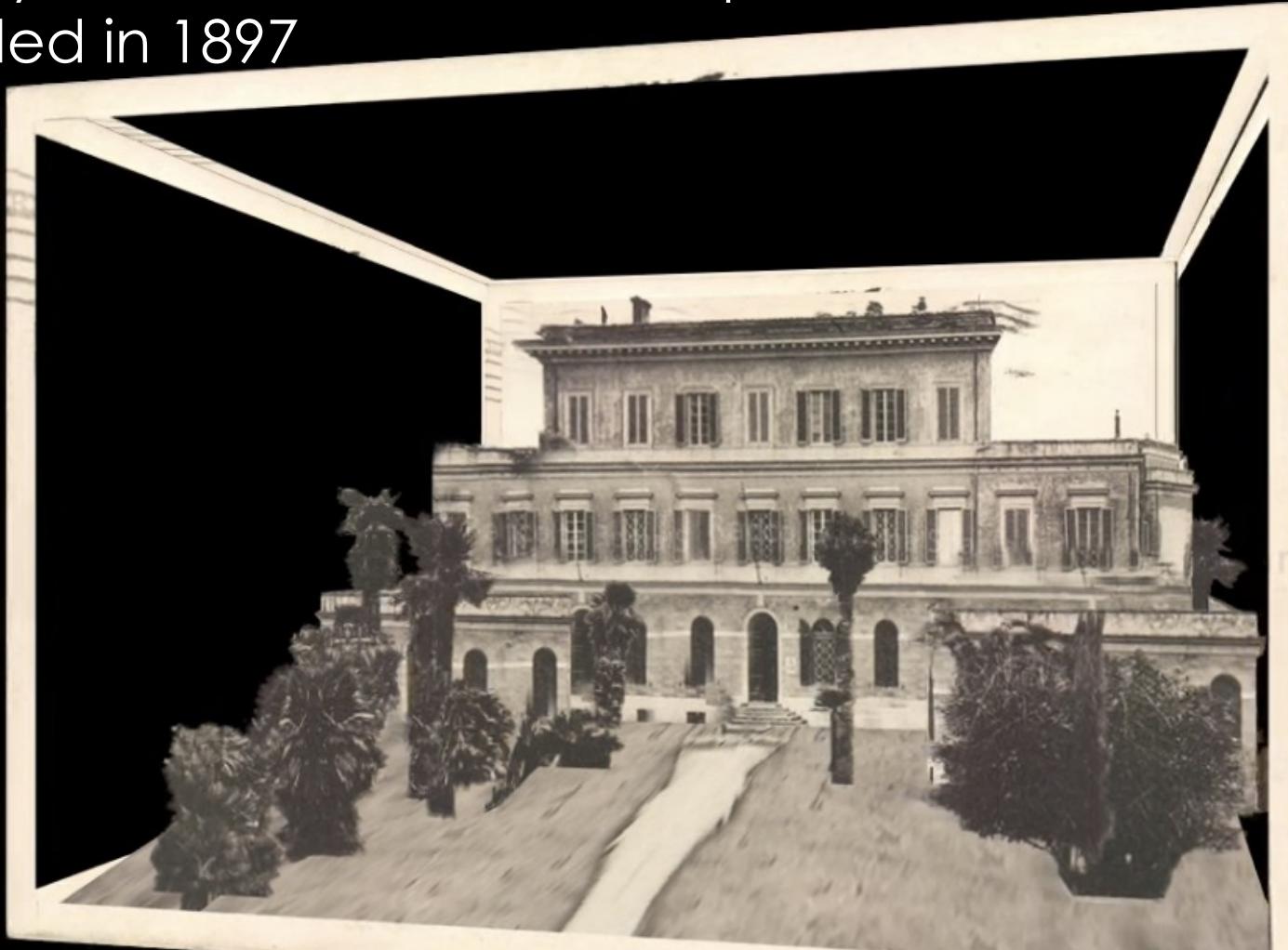
# EPS-SIF INTERNATIONAL SCHOOL ON ENERGY



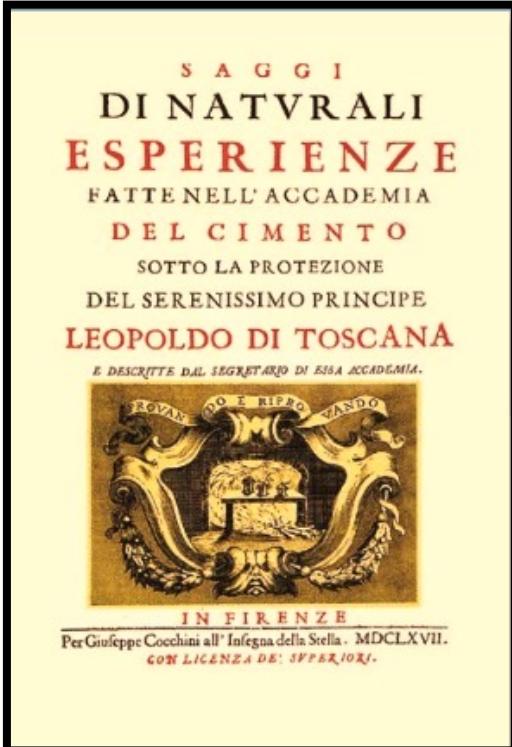
**A very important SIF activity**

SOCIETÀ ITALIANA DI FISICA  
Italian Physical Society

How and where it all began ...  
at the Physics Institute of Via Panisperna in Rome  
SIF founded in 1897



Institute of Via Panisperna in the twenties : Orso Mario  
Corbino (who was also SIF president) formed and supported  
the group of Enrico Fermi, Oscar D'Agostino, Emilio  
Segrè, Edoardo Amaldi, Franco Rasetti, Bruno Pontecorvo,



The emblem of SIF logo reproduces the one in *Saggi di Naturali Esperienze*  
*Essays on Natural Experiments*  
Accademia del Cimento  
(Florence, 1667)

The Academy was founded by Leopold of Tuscany and animated by Galileo Galilei's disciples

This choice of logo symbolizes an ideal link to the old Accademia del Cimento from which also the SIF historic journal *IL NUOVO CIMENTO* derives its name

In the logo:

- fireplace
- three crucibles filled with molten metal
- fluttering decorative ribbon
- motto

**provando e riprovando**  
*trying and trying again*

which can be found also in a tercet of the third canto of Dante's *Paradiso*, but with the different meaning of

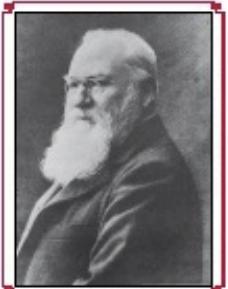
*proving and disproving*

*"Quel sol che pria d'amor mi scaldò 'l petto, di bella verità m'avea scoperto, provando e riprovando, il dolce aspetto"*

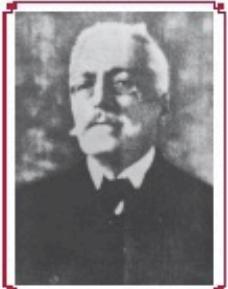


120 ANNI  
1897-2017

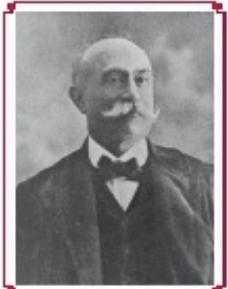
## I Presidenti della Società Italiana di Fisica



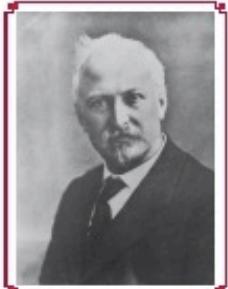
Pietro Blaserna  
1897–1898  
Università di Roma



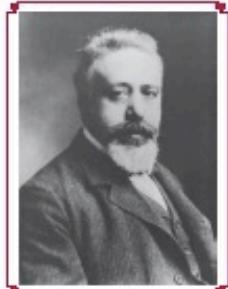
Antonio Röti  
1899  
Università di Firenze



Augusto Righi  
1900–1902, 1903, 1910  
Università di Bologna



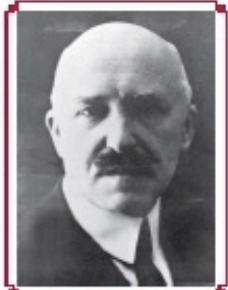
Angelo Battelli  
1905–1906  
Università di Pisa



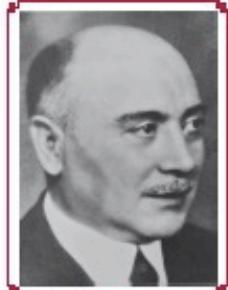
Vito Volterra  
1907–1908  
Università di Roma



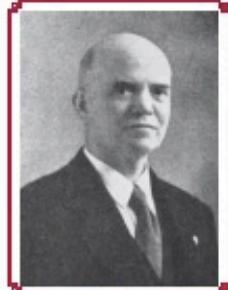
Michele Cattaneo  
1910–1912  
Università di Napoli



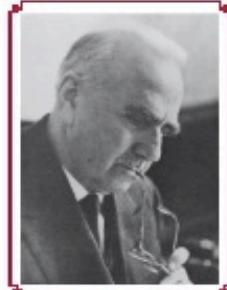
Antonio Garbasso  
1913–1914, 1920–1925  
Università di Firenze



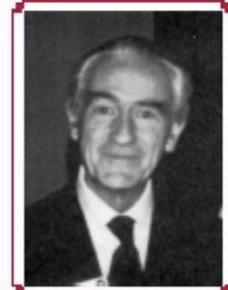
Orso Mario Corbino  
1915–1918  
Università di Roma



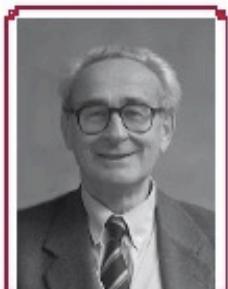
Quirino Majorana  
1926–1945  
Università di Bologna



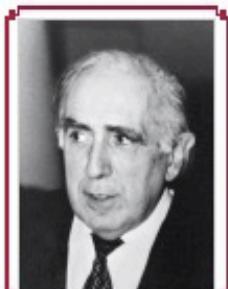
Giovanni Polvani  
1947–1961  
Università di Milano



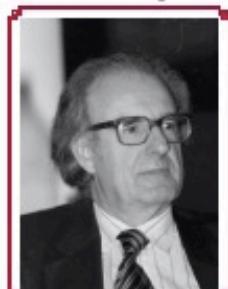
Gilberto Bernardini  
1962–1967  
Università di Firenze



Giandomenico Toraldo di Francia  
1968–1970  
Università di Firenze



Carlo Castagnoli  
1974–1981  
Università di Trieste



Renato Angelo Ricci  
1981–1986  
Università di Padova



Giuseppe Franco Bassani  
1989–2007  
Scuola Normale Superiore di Pisa



Luisa Cifarelli  
2008  
Università di Bologna

# *The origins of the Varenna school*

1953.

President **Giovanni Polvani** creates The International School of Physics of Varenna

Polvani concluded his inaugural address of the first course, titled “Issues related to elementary particle detection, with special attention to cosmic radiation”, with the words:

*“With the hope that this ‘dress rehearsal’ – being as it is in the hands of so outstanding scientists and followed by students with so impatient inquiring mind – might proceed worthily and fruitfully grow, I have the honour to declare open the 1953 summer course of the International School of Physics of the Italian Physical Society.”*

Director: Giampietro Puppi

Lecturers includes: Patrick Blackett, Cecil Powell, Beppo Occhialini, Hannes Halfvén

## **Enrico Fermi International schools**

**and**

## **EPS-SIF international School on energy**

**at  
Villa  
Monastero**

# **Villa Monastero**

Villa Monastero, a property of the Province of Lecco, is one of the most interesting attractions of the territory thanks to its strategic location, its history, its landscape. Since 2004 its fourteen rooms can be visited following a charming itinerary. The Villa offers rooms and facilities to hold meetings, conferences, etc.

The Villa is surrounded by a spectacular and fascinating botanical garden which extends for two kilometres from Varenna to Fiumelatte, with several rare botanic species; it is visited yearly by about 50.000 people and offers recreation and learning opportunities thanks to the presence of many botanical species, both indigenous and exotic.





# 1954

The 1st course in 1953 was a real success, to the extent that Puppi was asked to direct another one in the Summer of 1954.

The 2nd course was again devoted to elementary particles, this time placing emphasis on accelerators:

*“The contribution from existing and planned accelerators to elementary particles physics”.*

In his opening address Puppi talked about ***“the fantastic world of high-energy phenomena”***.

To illustrate them, eminent physicists were invited to lecture, like Enrico Fermi, Werner Heisenberg, Gilberto Bernardini, Bruno Rossi ...

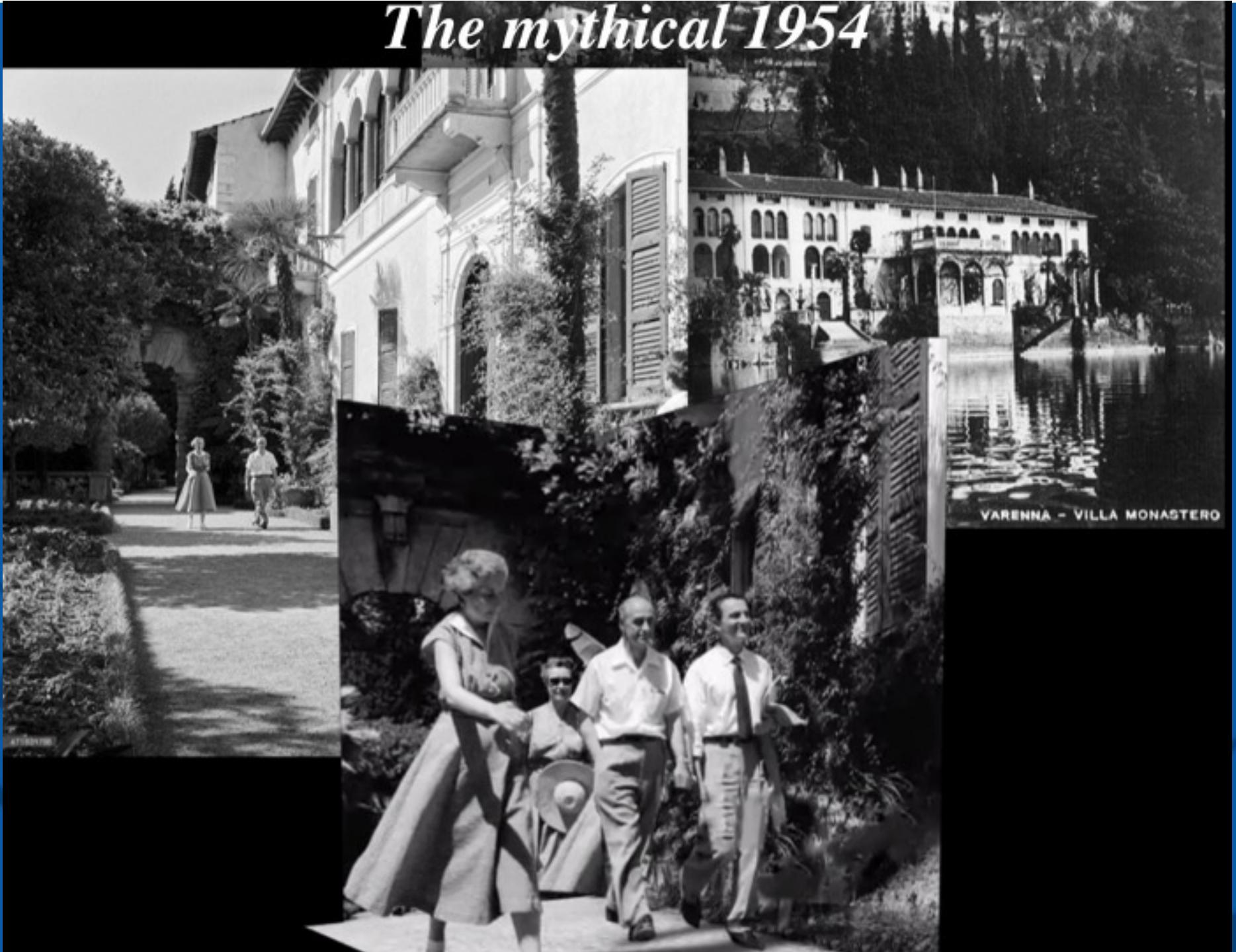
Enrico Fermi  
International  
schools

and

EPS-SIF  
international  
School on  
energy

at  
Villa  
Monastero

*The mythical 1954*

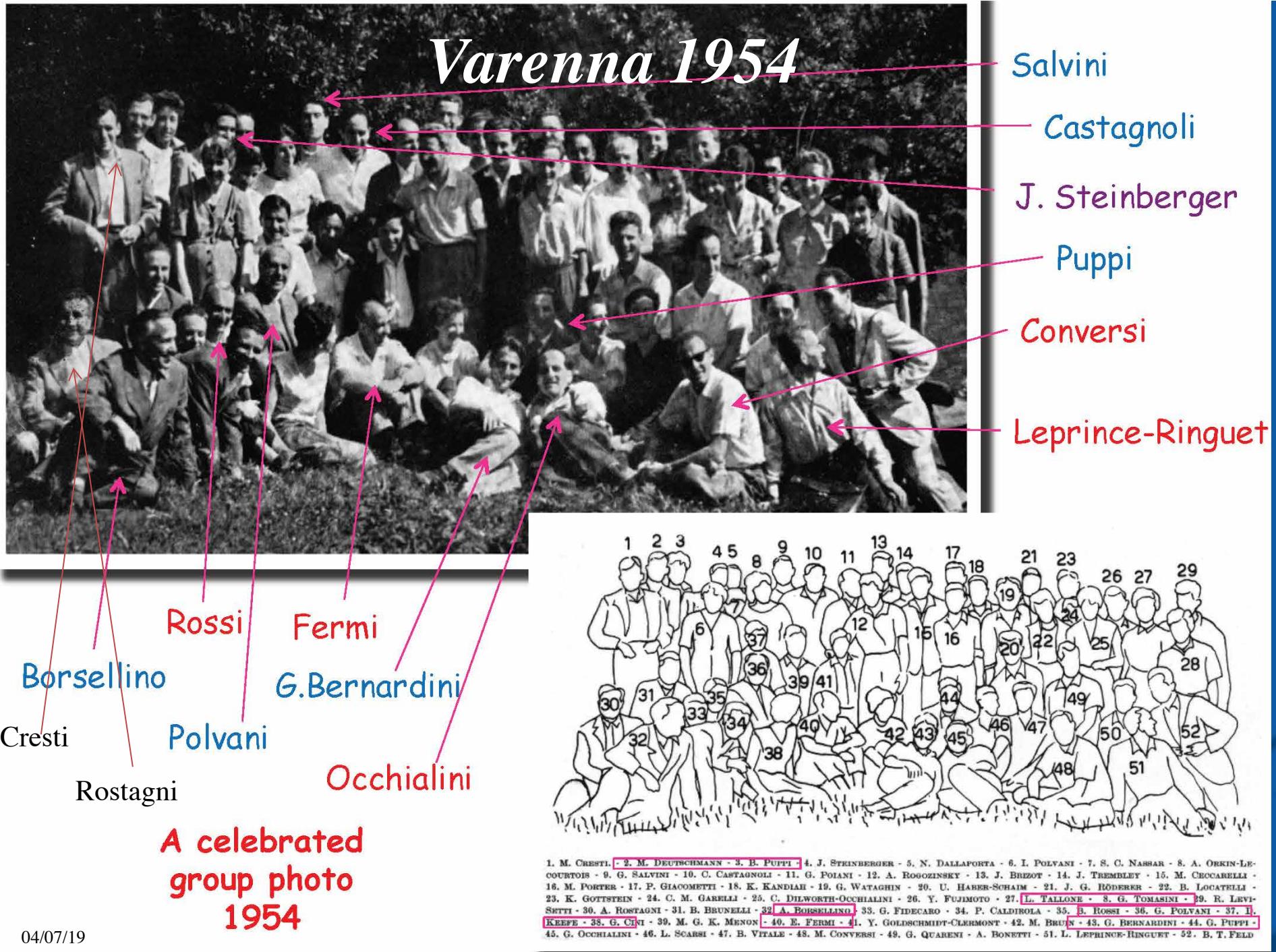


Enrico Fermi  
International  
schools

and

EPS-SIF  
international  
School on  
energy

at  
Villa  
Monastero  
Varenna



# Enrico Fermi International schools

and

# EPS-SIF international School on energy

at  
Villa  
Monastero  
Varenna

INTRODUZIONE	
G. POLVANI – Discorso inaugurale . . . . .	pag. 4
G. PUPPI – Prolusione . . . . .	» 8
PARTE PRIMA – Fisica delle particelle elementari.	
SEZIONE I: Questioni relative alla Fisica dei pioni e nucleoni . . . . .	
E. FERMI – Lectures on Pions and Nucleons . . . . .	» 17
W. HEISENBERG – The production of Mesons in very High Energy Collisions . . . . .	» 96
SEZIONE II: Questioni relative alla fotoproduzione e fenomeni connessi . . . . .	
G. BERNARDINI – Lectures on Photoproduction . . . . .	» 104
B. T. FELD – Photomeson Production from Hydrogen . . . . .	» 139
B. T. FELD – The Photodisintegration of the Deuteron at High Energies and Associated Phenomena . . . . .	» 145
S. LOKANATHAN and J. STEINBERGER – Search for the $\beta$ -Decay of the Pion . . . . .	» 151
SEZIONE III: Questioni riguardanti i mesoni pesanti prodotti dai raggi cosmici o dal cosmotrone . . . . .	
B. ROSSI – Lectures on Fundamental Particles . . . . .	» 163
M. CECCARELLI – Results on Heavy Mesons . . . . .	» 227
A. BONETTI – On the Identification of Charged Hyperons and the Establishment of Their Decay Schemes in Nuclear Emulsions . . . . .	» 231
C. DILWORTH and B. ROSSI – Comparisons of Results on K-Particles Disintegrating at Rest in Cloud Chambers and Photoemulsions . . . . .	» 239
N. DALLAPORTA – Statistical Evidence Concerning the $\chi$ -Meson Decay . . . . .	» 247
A. DE BENEDETTI, C. M. GARELLI, L. TALLONE and M. VIGONE – Two Examples of a Star Emitting Two Heavy Unstable Particles . . . . .	» 249
E. AMALDI – On the Measurement of the Mean Life-Time of Strange Particles . . . . .	» 253
R. LEVI SETTI – Unstable Fragments . . . . .	» 263
SEZIONE IV: Questioni relative all'origine dei raggi cosmici . . . . .	
B. ROSSI – Lectures on the Origin of Cosmic Rays . . . . .	» 275
U. HABER-SCHAIM – The Energy Spectrum of the Primary Cosmic Radiation . . . . .	» 336
PARTE SECONDA – Progetti di macchine acceleratrici.	
SEZIONE I: Progetto di macchina acceleratrice per il Centro Europeo di Ricerche Nucleari . . . . .	
E. AMALDI – CERN, the European Council for Nuclear Research . . . . .	» 339
J. B. ADAMS – The Alternating Gradient Proton Synchrotron . . . . .	» 355
A. CITRON and M. G. HINE – Experimental Facilities of the CERN Proton Synchrotron . . . . .	» 375
G. LÜDERS – Theory of Particle Orbits in the Alternating Gradient Synchrotron . . . . .	» 392
T. G. PICKAVANCE – Synchrocyclotrons and the CERN 600 MeV Machine . . . . .	» 403
SEZIONE II: Progetto inglese di macchina acceleratrice . . . . .	
T. G. PICKAVANCE – Proton Linear Accelerators for Nuclear Research and the A.E.R.E. 600 MeV Project . . . . .	» 413
SEZIONE III: Progetto francese di macchina acceleratrice . . . . .	
H. BRUCK et R. LÉVI-MANDEL – Sur le projet du Synchrotron à protons de Saclay . . . . .	» 423
SEZIONE IV: Progetto italiano di macchina acceleratrice . . . . .	
G. SALVINI – The Italian Design of a 1000 MeV Electronsynchrotron. A Comparisons between the Strong and the Weak Focusing . . . . .	» 442
E. PERSICO – A Theory of the Capture in a High Energy Injected Synchrotron . . . . .	» 459

## The “fantastic world

Varenna 1954

Enrico Fermi and Werner Heisenberg gave the first two lectures of a series on the physics of pions and nucleons

Gilberto Bernardini, Bernard T. Feld gave a second group of lectures on photoproduction

Bruno Rossi lectured on fundamental particles and on the origin of cosmic rays

Particle accelerator projects at CERN, in the UK, in France and in Italy were illustrated by world experts

# Fermi

Fermi gave 16 lectures in Varenna on “**PIONS and NUCLEONS**” from 16th of July to 6th of August 1954

Fermi passed away on 28 November 1954

On the 6th of August 1955 President Polvani in an official commemorative ceremony in Varenna and Como in the presence of Fermi’s wife, Mrs. Laura Fermi, and Fermi’s sister, Mrs Maria Sacchetti, announced that the School would be named after Enrico Fermi



A bronze medallion with his low-relief effigy was unveiled in memory and in honour of Enrico Fermi at Villa Monastero



Also a porphyry plaque was placed bearing a Latin epigraph:

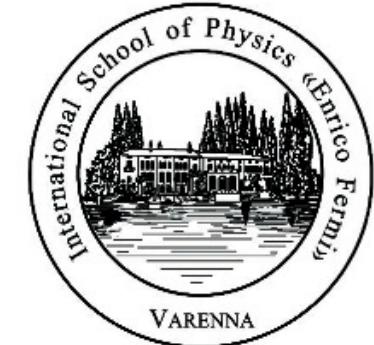
**ENRICO FERMI**  
— 1954 - 53rd of his life —

*"Here with quiet spirit among so many natural beauties,  
I revealed for the last time,  
to a rank of men of science, the  
ultimate and most remote elements  
in motion inside the atoms,  
with which I had already made my  
name immortal"*

In 1955 in Como at the Tempio Voltiano,  
Isidor I. Rabi was invited to give the official  
commemorative address in honour of Enrico Fermi

*"Here in Italy where his memory is so alive and where so many have heard Fermi lecture I do not have to describe the remarkable fascination he could induce in any audience. He used no histrionics in his delivery. It was always calm and deliberate. **The fascination lay in the feeling of clarity and simplicity he could impart to the audience.** They felt illuminated and had the sense of participating in profound and beautiful insight"*

This is what Fermi's lectures still inspire



On the 70th anniversary of the Nobel Prize award to Enrico Fermi in 1938 the Italian Physical Society has reprinted in a special issue of **La Rivista del Nuovo Cimento** the original "Lectures on Pion and Nucleons" by Enrico Fermi

Enrico Fermi  
International  
schools

and

EPS-SIF  
international  
School on  
energy

at  
Villa  
Monastero  
Varenna

# *The Italian Physical Society Fermi Prize and Medal*



The prestigious prize "Enrico Fermi" has been awarded starting from 2001, to commemorate the great scientist on the occasion of the centenary of his birth

**Enrico Fermi  
International  
schools**

**and**

**EPS-SIF  
international  
School on energy  
at  
Villa Monastero  
Varenna**

**NOW**

**> 200 courses**

**> 13000 participants**

**60 Nobel Prize winners**

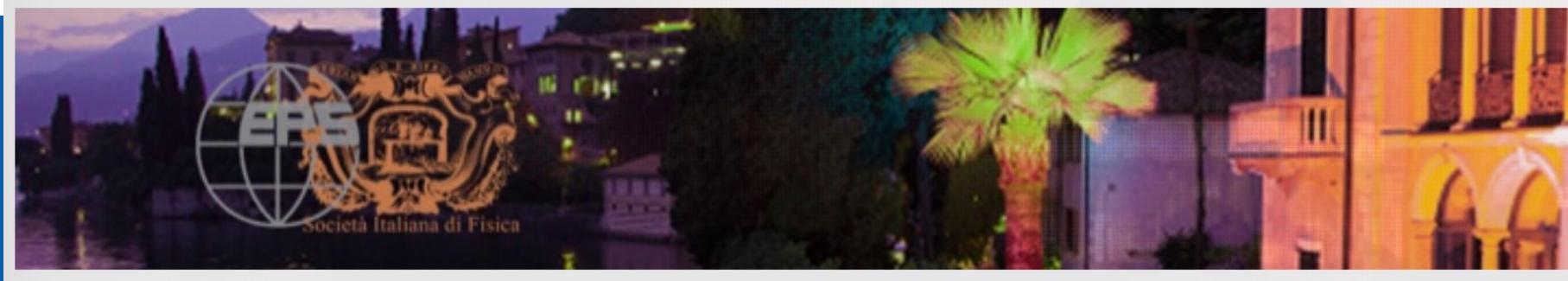
## Nobel Prize Winners in Varenna

Along the years several Nobel Prize Winners participated in the International School of Physics "Enrico Fermi" in Varenna as lecturers or directors.

Here is the list:

Name (prize awarded in year)	in Varenna
Serge Haroche (2012)	1992 - 2001 - 2008
David J. Wineland (2012)	1991 - 2001
Roy J. Glauber (2005)	1967 (director) - 1991
John L. Hall (2005)	1991 - 1992
Th. W. Hänsch (2005)	1975 - 1992 (director) - 1995 - 1998 - 2000 - 2006 (director)
A. J. Leggett (2003)	1987
Riccardo Giacconi (2002)	1965 - 1975 (director)
Eric A. Cornell (2001)	1991 - 1998 - 2001
Wolfgang Ketterle (2001)	1991 - 1998 - 2006 (director) 1991 - 1998 - 2006 (director)
Carl E. Wieman (2001)	1991 - 1992 - 1998 (director)
Robert B. Laughlin (1998)	2002
Steven Chu (1997)	1991 - 1992
C. Cohen-Tannoudj (1997)	1960 - 1991
William D. Phillips (1997)	1991 (director)-1995-1998-2000
Georges Charpak (1992)	1984
P.-Gilles de Gennes (1991)	1973 - 1996 -2003
Norman F. Ramsey (1989)	1991 - 2005
Wolfgang Paul (1989)	1965
Leon M. Lederman (1988)	1959 - 1964
Melvin Schwartz (1988)	1964
Jack Steinberger (1988)	1954 - 1964 - 1967 (director)
K. A. Müller (1987)	1956 - 1973 (director) - 2003
Klaus von Klitzing (1985)	2012
Carlo Rubbia (1984)	1987 - 1990
S. Chandrasekhar (1983)	1975
William A. Fowler (1983)	1965

Nicolaas Bloembergen (1981)	1963 - 1975 (director)
Arthur L. Schawlow (1981)	1963 - 1992
Sheldon Lee Glashow (1979)	1964
Abdus Salam (1979)	1971
Arno Allan Penzias (1978)	2004
Philip W. Anderson (1977)	1966 - 1983 - 1987
Sir Nevill F. Mott (1977)	1957
John H. van Vleck (1977)	1956
Aage Niels Bohr (1975)	1976 (director) - 1955
Ben Roy Mottelson (1975)	1960 - 1976 - 1992
Leo Esaki (1973)	1991
Leon Neil Cooper (1972)	1955
John R. Schrieffer (1972)	1957 - 1973 - 1983 - 1987 (director) - 1992 - 1997
Dennis Gabor (1971)	1958
Hannes O. G. Alfvén (1970)	1959 (director)
Louis E. F. Néel (1970)	1956
Luis Walter Alvarez (1968)	1964 (director)
Hans Albrecht Bethe (1967)	1984
Alfred Kastler (1966)	1956 - 1960
Charles Hard Townes (1964)	1955 - 1960 - 1963 (director)
Eugene Paul Wigner (1963)	1963 (director)
Donald Arthur Glaser (1960)	1953
Tsung-Dao (T.D.) Lee (1957)	1964 (director)
John Bardeen (1956)	1983
Willis Eugene Lamb (1955)	1963
Edwards Mills Purcell (1952)	1956
Cecil Frank Powell (1950)	1953
Patrick M. S. Blackett (1948)	1953
Wolfgang Pauli (1945)	1958
Isidor Isaac Rabi (1944)	1955
Enrico Fermi (1938)	1954
Paul A. M. Dirac (1933)	1972
Werner K. Heisenberg (1932)	1954
L.-V.P.R. de Broglie (1929)	1970



The lectures of the Courses of the School on Energy are available online  
in EPJ Web of Conferences and are published in the book series  
**“Lecture Notes of the Joint EPS-SIF International School on Energy”**

### COURSE 1 (2012)

New strategies for energy generation,  
conversion and storage  
Directors: L. Cifarelli, F. Wagner,  
D. Wiersma

### COURSE 2 (2014)

Energy: basic concepts and forefront  
ideas  
Directors: L. Cifarelli, F. Wagner

### COURSE 3 (2016)

Jointly organized with the 69th  
Course of the International School  
of Solid State Physics: “Materials for  
Energy and Sustainability V”  
Directors: D. Cahen, L. Cifarelli,  
D. Ginley, A. Slaoui, A. Terrasi,  
F. Wagner

### COURSE 4 (2017)

Advances in Basic Energy Issues  
Directors: L. Cifarelli, F. Wagner

**Course 5 – 22 - 27 July 2019 -**  
**Energy: Where we stand and where we go**  
**Directors : Luisa Cifarelli, Friederich Wagner**

**Very successful schools and excellent proceedings!!**



Entrance at the  
school in 2021 !

Entrance at the school!

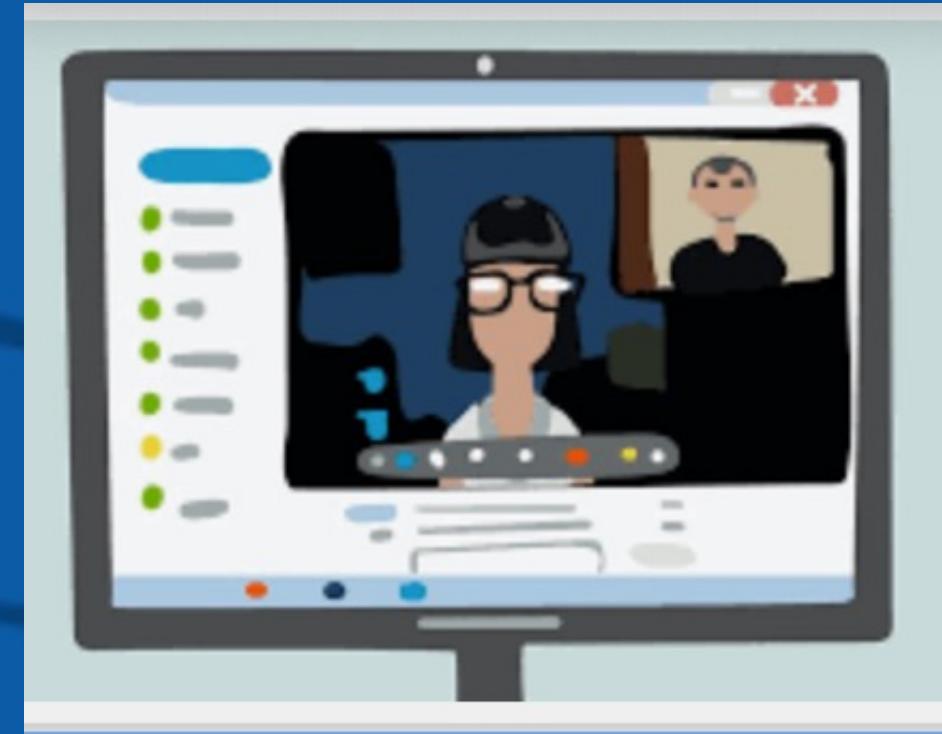
**Very happy for your participation in this School !  
We appreciate your interest**



..... we expect also this year a successful school

a good portfolio of timely topics forms the program and the school Lectures, planned to stimulate your interest

and the technical and organizational issues are well taken care – **many thanks to our SIF staff**



Also many thanks to the students of AISF helping us

Thanks  
to  
everyones  
and  
enjoy the  
School !!

**Directors**

Luisa Cifarelli - Francesco Romanelli -

**Scientific Secretary**

Neelima Agrawal -

**Scientific Committee**

Angela Bracco - Luisa Cifarelli -

Jozef Ongena -

Francesco Romanelli -

**Petra Rudolf -**

Friedrich Wagner -

**Lecturers**

Christoph Buchal - Jonathan Craig -

Horst Hahn - Sylvie Leray

Jozef Ongena - Eva Pellicer -

Marco Ripani - Francesco Romanelli

Petra Rudolf - Jacquelien Scherpen -

Hauke Schmidt - Susanne Siebentritt

Daniela Thrän -

Moniek Tromp -

Machteld Van den Broek -

Stefano Vella -

Olivier Vidal -

Friedrich Wagner -

Hermann-Josef Wagner)

