



**Sapienza Università di Roma**  
**The Enrico Fermi chair**

The Enrico Fermi chair was established in 2011 by Minister of Education, University and Research (MIUR) Mariastella Gelmini to promote the diffusion of modern physics beyond the restricted boundary of university courses and to honor the Italian scientific tradition. Each year during one semester, the recipient of the chair will hold a series of Enrico Fermi Lectures in Physics. Lectures are open to the general public and cover fields of research to which the recipient has significantly contributed. A written version of the Lectures will be published by the Physics Department of Sapienza Università di Roma.

The universal genius of Enrico Fermi has left lasting contributions to practically all areas of modern physics, from atomic, nuclear and particle physics, to solid state, cosmic rays, general relativity up to high yield computing.

In the Academic Years 2013-14 and 2014-15, the Enrico Fermi Lectures will be dedicated to "Present and future of elementary particle physics" and given by Luciano Maiani, theoretical physicist, former president of Istituto Nazionale di Fisica Nucleare and of Consiglio Nazionale delle Ricerche, former Director General of CERN. Luciano Maiani at present chairs the Commissione Grandi Rischi of the Department of Civil Protection.

Successively, the chair will be attributed every second year by the Minister of MIUR, upon proposal of the Physics Department of Sapienza Università di Roma, following an international call. Recipients should not belong to La Sapienza.



## **Enrico Fermi Lectures in Physics, 2013-2015 Present and future of elementary particle physics**

Luciano Maiani, Professor Emeritus of Theoretical Physics  
Sapienza Università di Roma

Lectures in 2013-2014 will illustrate the evolution of Particle Physics from the discovery of the Dirac positron to the discovery of the Higgs boson.

**Lectures will start on november 5, 2013 until march 27, 2014, tuesday and thursday, 15:00 to 16:00, at the Dipartimento di Fisica G. Marconi, in piazzale Aldo Moro 5, Roma.**

The conceptual and experimental basis of the theory of fundamental particles and interactions, known as the Standard Model, will be reviewed, as well as the expectation of new discoveries, which may give a clue to the many unsolved problems left by the Standard Theory itself.

A part of the lectures will be dedicated to the flourishing of Particle Physics in Italy, with short historical portraits of the main protagonists, and to the technologies which have originated from particle physics, particularly in medicine and ICT. The course envisages a number of seminars given by outstanding investigators on subjects complementary to the main argument of the lectures.

**The Enrico Fermi Lectures are intended for a non specialized audience.**  
Mathematical complexity will be kept to a minimum and, where necessary, restricted to a few specifically devised lectures.



## Highlights of 2013-2014 Lectures.

1. Quanta, fields and particles. Matter and antimatter. Yukawa proposes a new particle to transmit nuclear forces.
2. Neutrinos: Dirac or Majorana?
3. From cosmic ray observatories to particle accelerators. The creation of CERN.
4. Quantum theory of Electrodynamics (QED). A strategy to eliminate infinities from physics.
5. Facing the post-war explosion of the number of “elementary particles”: nuclear democracy or elementary constituents?
6. Symmetries of particle physics. Three Quarks to explain subnuclear matter.
7. Theory of the Weak Interaction after Fermi. Nicola Cabibbo restores Universality. More charming and beautiful quarks. Dreams of unification.
8. Particle physicists in post war Italy: an exceptional season and few portraits.
9. The theory of Yang and Mills in search for an application. Schwinger and then Glashow find the path to a unified theory of weak and electromagnetic forces.
10. High energy collisions reveal a new regime: asymptotic freedom in experiments and in theory. The fundamental theory of the nuclear interactions is in sight: QCD.
11. Spontaneously broken symmetries. The Brout-Englert-Higgs particle.
12. Weinberg and Salam make the crucial step.
13. Discovery and physics of the Intermediate Vector Bosons. The Large Electron Positron collider at CERN.
14. The making of the LHC. New technologies and applications from particle physics.
15. The discovery of the Higgs boson.
16. Reflections about the future.