b Science Communication and Science Museums: Prospects and New Ideas

Rome, 18 - 19 May 2017



The Enrico Fermi exhibition as museum prototype: experience and prospects



L. Cifarelli & R. Nania



- The Centro Fermi in Rome
- A brief biography of E. Fermi
- The exhibition in Genova and Bologna
- Ideas for the museum in Via Panisperna



Old Institute of Physics in Via Panisperna in Rome



The mission

CENTRO FERMI is a research institution established in 2001 and devoted to interdisciplinary studies. It aims to integrate the knowledge generated in different fields, and to promote discussion among top scientists with different areas of expertise, in order to create what **Enrico Fermi** would have liked to establish in the Institute where he worked and that now bears his name.

A centre dedicated to frontier research in physics and to its <u>wide interdisciplinar applications</u> for the benefit of humankind

First President Prof. A. Zichichi





Main activities

- 1. Grants for "New Talents" and Senior/Junior researchers to study original and interdisciplinary research topics
- 2. Research Projects, for the realization and promotion of interdisciplinary original research
- 3. Activities for the Dissemination of Scientific Culture and Historic Memory through the restoration of the "Monumental Complex" of Via Panisperna, to be used in part for the Museum

Research Projects

- Extreme Energy Events (EEE) Science inside Schools → Astrophysics & Education
- Advanced Techniques for Fundamental Physics → Particle Physics, Space & Technology
- 3. Advanced Techniques for Biomedical Applications
- 4. Energy
- 5. Environment and Cultural Heritage
- 6. History of Physics





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Dissemination of Scientific Culture and Historic Memory

MUSEO FERMI <u>working group</u> operative since early 2013 and presentation of MUSEO FERMI Project in 2014

> Fermi Exhibition at the <u>Genova</u> <u>Science Festival</u> (October 2015-January 2016) and at <u>Bologna</u> (February 2016- May 2016)









- Enrico Fermi was born in Rome in 1901
- He obtained in 1922 he obtained his Master in Physics at the University of Pisa and the diploma from the Scuola Normale Superiore of Pisa
- He was immediately attracted to quantum physics which at the time was not well known in Italy: he spent periods abroad in Göttingen (Max Born) and Leiden (Paul Ehrenfest) in 1923-1924
- In 1924-1926 Fermi was visiting professor of Mathematical Physics at the University of Florence
- In 1926 he obtained the first chair of Theoretical Physics in Italy, specially created for him at the University of Rome by Orso Mario Corbino





In 1926 Fermi formulated a new statistical theory to describe the collective behaviour of particles on the quantum scale, known today as Fermi-Dirac statistics

The exclusion principle introduced by Pauli in 1925 to explain the electronic structure of atoms was transformed into a universal principle



In 1933 Fermi publish the beta radiation theory with electron and (anti)neutrino non existing in the nucleus but created in the decay.

New type of interaction: the nuclear weak interaction







The Nobel Prize for Physics in1938



In 1934 Fermi starts experiments to induce artificial radioactivity using neutrons instead of charged alpha-particles. The famous <u>"Ragazzi di via Panisperna".</u>

Discovery of the neutron-induced beta radioactivity in Alluminium and several others compound.

Discovery that neutrons when slowed down passing through paraffin wax or water, substances rich in Hydrogen, are much more efficient in producing induced radioactivity in samples of Silver and of other heavy elements.







After the ceremony in Stockholm on 10 December 1938, Fermi carried out his decision to move with his family to the United States. where his research could develop much further.



On 2nd December 1942 he obtained the <u>first controlled fission reaction</u> using natural Uranium and Graphite. This is the start of a new era for energy production.

" The Italian navigator has landed in the new world ..."





After 1945 Fermi continued his research in different fields:

A theory for the acceleration of Cosmic rays





Several experiments at accelerators and the discovery of the $\Delta^{\text{++}}$ particle

Strong support for the development of computer technologies



His memorable lessons at the Italian Physical Society's School in Varenna in 1954, only a few months before his death, are part of Fermi's last scientific gift to Italy.

CENTRO FERMINE Museo Storico della Fisica e Centro Studi e Ricerche Enrico F A dual genius between theories and experiments

Arch. Marinora Sanges





The Enrico Fermi Exhibition The importance of the location

Bologna Chiesa di San Mattia







A Brilliant Life









Our Universe of Fermions and Bosons















The formidable theory of beta radiation





An all Italian Nobel Prize







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The Enrico Fermi Exhibition -4

An all Italian Nobel Prize		low Al 0' 9200 20' 94/4 { 314 = 10,5	19 Maria 4 Maria 4
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The Italian navigator has landed in the new world.









And now accelerators







Fermi's last gift to Italy







The mistery of cosmic rays







The Enrico Fermi Exhibition – the theater



In the abside of the church there was continuous projection of documentaries on E. Fermi life by APS and Istituto Luce.



The Enrico Fermi Exhibition : "Stasera alla Mostra – This evening at the Exhibition"



In the abside of the church a series of scientific Happy-hours with movies, conferences, 20 theater pieces ...



The Enrico Fermi Exhibition : in numbers (Genova + Bologna , ~ 6 months)



Important the publicity via media: newspaper, radio, television, Facebook, university, schools...

But MORE IMPORTANT was through word of mouth !





The Enrico Fermi Exhibition : Special for kids !

A long time ago in a galaxy far, far away....





Rebel spaceships, striking from a hidden base, have won







The Enrico Fermi Exhibition : Comments in the media

una mostra che dà più di quel che promette, dovizia di tecnologie interattive ma senza la retorica del mezzo, spettacolare la possibilità di vedere il proprio corpo tradotto in bosoni e in fermioni su due grandi (ci stavo anch'io!) schermi paralleli; certo, quando profitto delle spiegazioni di un gentile fisico in sala, capisco meglio, però la mostra è un bell'esempio di divulgazione del XXI secolo, la consiglio anche ai museologi e agli allestitori; viene da genova, ora è in san mattia a bologna, prossima tappa: roma



Mostra Enrico Fermi

Una Mostra che mette in rilievo la figura di Enrico Fermi, un uomo dalla mente creativa eccezionale e dalla duplice genialità in equilibrio tra teorie ed esperimenti. Museo Civico, Festival della Scienza 2015, Genova 23 ott.-1 nov. 2015

MOSTRAFERMI.IT

LA MOSTRA/ FINO AL 10 APRILE IN S. MATTIA Scoprire Enrico Fermi nella città di Marconi Una mostra immerge nel mondo di Fermi All'Ex Chiesa di San Mattia fino al 10 aprile PASSAPAROLA Fisica senza fisime non perdetevi lamostra su Enrico Fermi DRINFILLS FORDECIN



The Enrico Fermi Exhibition : Visitors comments

Non mi sono mai sentite meglio che sotto pome

Thanks Cireat exhibition. I barnt a lot about this monderful man who contributed so much to mankind and learing Monique Leary (Sydney, Aus). Truly visionary - a truly visionary l'Xperience, Bravo TF the children love it, it much be acime

V"H ESABAC

de fermione 11

MARTINA, 5 anni: Questo museo è bollissiud e roglio renstarce a vivere qui ! MARTINA

La rappresentacione de fermion e di boson à ma sulle core foi helle ele los viño no mo puio-La cofra anasonica del prodens or Arellino, in'emosione! gooso' forkood fina

PIANO TERRA

Ambienti riservati alla











Rendering from the first ideas for the museum



The Old Aula Magna







The New Aula Magna E. Fermi





The Enrico Fermi Exhibition - Prospects

- 1. Importance of a strong integration with the location, trying to use the windows, arcs, spaces to guide and to catch the attention of the visitor
- 2. Maintain and possibly improve the interaction with the visitors to stimulate its curiosity in an active way.
- Enlarge the section dedicated to the old Institute of Physics with some panels dedicated to other important physicists (for example E. Majorana)
- 4. Enlarge the part dedicated to the research activities of Centro Fermi, also here focusing as much as possible on interactive activities
- 5. Improve the moments where students can actively participate (small laboratories, seminars, Masterclasses....)
- 6. Profit of the Aula Fermi and the garden to organize public events dedicated to scientific items (seminars, movies, theater pieces....), also inserting the museum in the cultural and scientific circuits of Rome
- 7. Possibility of temporary exhibitions, also reinforcing exchanges of material with other museums in the world.