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exhibit 'Inseguimento dell'atomo: Enrico Fermi e il progetto Manhattan' Rachel Fermi, Esther Samra  
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# Enrico Fermi

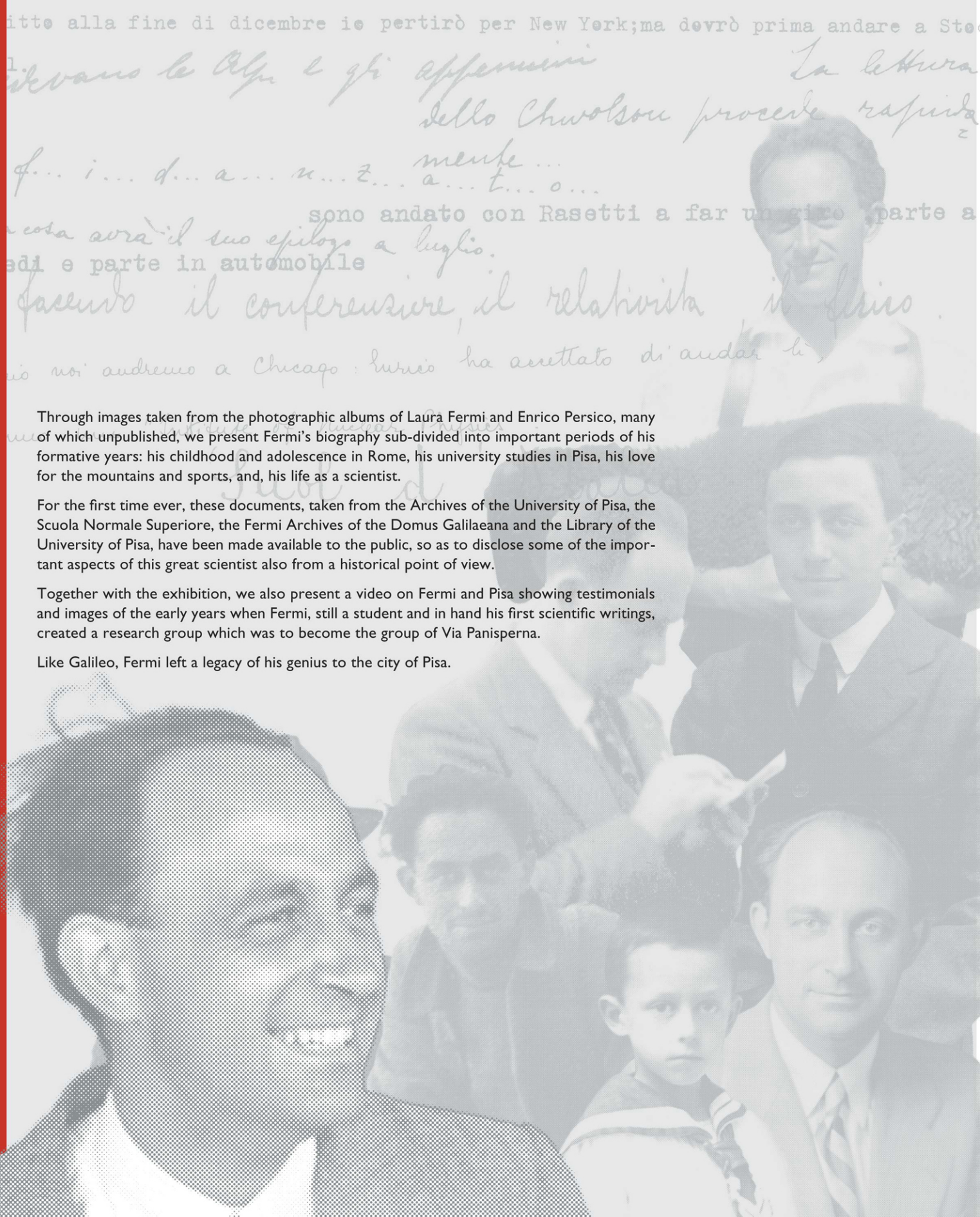
Unpublished images and documents

Through images taken from the photographic albums of Laura Fermi and Enrico Persico, many of which unpublished, we present Fermi's biography sub-divided into important periods of his formative years: his childhood and adolescence in Rome, his university studies in Pisa, his love for the mountains and sports, and, his life as a scientist.

For the first time ever, these documents, taken from the Archives of the University of Pisa, the Scuola Normale Superiore, the Fermi Archives of the Domus Galilaiana and the Library of the University of Pisa, have been made available to the public, so as to disclose some of the important aspects of this great scientist also from a historical point of view.

Together with the exhibition, we also present a video on Fermi and Pisa showing testimonials and images of the early years when Fermi, still a student and in hand his first scientific writings, created a research group which was to become the group of Via Panisperna.

Like Galileo, Fermi left a legacy of his genius to the city of Pisa.



# Enrico Fermi

Suoi d' Italia

La lettera dello Chvolson procede rapida mente...



**His father Alberto** was born in Bettola (Piacenza) in 1857. Alberto became an employee with the *Alta Italia* railway company because his father wanted him to support himself. In 1890 he moved to Rome to work for the *Mediterranea* company. There, in 1898, he married Ida De Gattis, a primary school teacher. He retired in 1921 from the position of Head of Division in the state railways. He died in 1927.



**His mother Ida De Gattis** was born in Bari in 1871; an orphan, she lived with her relatives in Milan. Laura Fermi described her as a woman with a strong sense of duty and an inflexible integrity: without denying her sons her affection, she expected them to share her strict moral code. She died in 1924.



**His sister Maria** was born in Rome on 12<sup>th</sup> April 1899. She was very religious, unlike her parents who were positivist free.



**His brother Giulio** was born in Rome on 10<sup>th</sup> June 1900. According to Enrico Fermi, Giulio was more intelligent than he was. «He was not less gifted for science and invention.» said his nephew

Giorgio Sacchetti. «They built a battery and a perfectly functioning gun». Ida Sacchetti remembers: «Giulio and Enrico drew up plans for a helicopter. Their father showed their project to Adolfo Amidei, an engineer, who was surprised by the fact that the helicopter could have flown».

**Enrico** was born on 29<sup>th</sup> September 1901. He was put out to nurse till February 1904. His character may have been influenced by this. «Enrico was the least demonstrative of the three brothers. When we took to the seaside in Ladispoli, Enrico never used to play with the other children on the train. He sat in a corner near the window on the opposite side, where there was room only for one person, with a little blackboard and a piece of chalk and kept silent. We didn't know what he did with that little blackboard, calculations drawings...» (remembered by a friend of his, Livia Garofolini).



From left: Emma Hamburg, Ida De Gattis, Enrico, Olga De Gattis, Giulio, Maria, Nelly Hamburg



Giulio and Enrico.



From right: Emma Hamburg, Giulio, Maria, Enrico and Nelly Hamburg.



From right: Enrico, Maria and Giulio.



From right: Enrico, Maria and Giulio.



Enrico between Giulio and Maria. Rome, 1906.



Standing from left: Giulio Fermi, Maria, Ida De Gattis, Giulio, Aunt Elina, Enrico.



From left: Enrico, Maria and Giulio with their mother. Rome, 1905.

Enrico and his brother Giulio, while making mechanical toys, came up against the first problems of physics and looked for solutions in the second-hand books they bought in Campo dei Fiori.

In 1914 Enrico ended his studies at the "Ginnasio" and the next year his brother Giulio died in a perfectly ordinary surgical operation. Giulio's death brought an atmosphere of mourning into the family, fostered by the desperation of their mother who had been particularly close to Giulio.

Enrico became a friend of one of his brother's class-mates, Enrico Persico, striking up a life-long friendship.

Amidei, an engineer from Volterra, a colleague and a friend of his father's, had discovered Enrico's exceptional intelligence and became a reference point for Enrico's studies: from him he received the books, mostly on mathematics, necessary to go on with the programme of scientific studies Amidei had suggested.

About this period there is only one precious testimony in a notebook his wife gave the "Domus Galilaena" in Pisa. In this notebook he jotted down the most difficult subjects of physics and mathematics he was studying; it is particularly surprising to find among them a synthesis of the theory of relativity, a subject not well known even in Italian universities.

Enrico skipped the third class, took the final high school exam one year in advance and decided to go up to University to study physics.

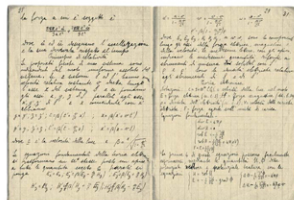
Following Amidei's advice he prepared for the examination to enter the "Scuola Normale", a very prestigious university establishment in Pisa. It was 1918.

During his holidays he wrote to his friend Persico saying he had started to study the Chvolson Physics Treatise (4,500 pages!). After less than a month he wrote again to his friend saying he had finished it.

The photo of his high school class, dated 12<sup>th</sup> October 1919, marks the end of his studies in Rome.



Letters from Fermi to his father while preparing for his entrance exam to the "Scuola Normale Superiore".



One of his school notebooks showing formulas on the theory of relativity.



Photo taken by Enrico Persico.



Fermi at school.



Engineer Adolfo Amidei with his family.



Alberto Fermi with Enrico Persico.



Class 8B of the Umberto I school with Fermi (far right) already attending the University of Pisa. Rome, 12 October 1919.





sono andato con Rasetti a far un giro ,parte a

## piedi e parte in automobile

As a young man he gladly went back to his father's village, Caorso, which he described to Persico as follows: «I have been in this little village lost in the plain for a week, doing nothing but resting. In the morning I usually wake up very late and go out for a walk; after lunch I have 4 or 5 games of bowls, so the day goes by. Yesterday was a very clear day and I could see the Alps and the Apennines: it was almost like being in the mountains».

As a young boy he went to the seaside at Ladispoli and then to Ostia that was nearer. He was an excellent swimmer, he loved playing football and cycling: «This morning I had a letter from Franco Rasetti saying that he would like to take part in the cycle ride with us – he wrote to Persico in 1922 – it would be better to train a little before leaving for the trip».

For his holidays he preferred to go to the mountains: to the Apuane, San Vito, Courmayeur, Ovindoli, Moena di Fiemme.

His wife Laura remembers when he arrived in Val Gardena for the first time, wearing knickerbockers and a tyrolese jacket: «When the path was steep he walked at the head of the group like a mountain guide. Every half hour three minutes rest. Someone asked him if he was ever out of breath and he answered: "No, my heart is a special heart, stronger than all others". And Laura concluded: «Fermi was all made up of special parts: his legs got less tired, his muscles were stronger and more elastic, his reactions more precise and prompt, his lungs were larger than other people's».

He also liked cars: «First I went to Santa Cristina – he wrote to Persico from Florence in 1926 – then, with Rasetti, we went on a trip, on foot and by car, to Florence, to the Adamello region, and then we went back to Florence by cars».



Enrico Fermi (kneeling) with his friends.



Enrico Fermi and Enrico Persico (busy with the car), Laura and a friend.



Enrico and Laura Fermi with friends.



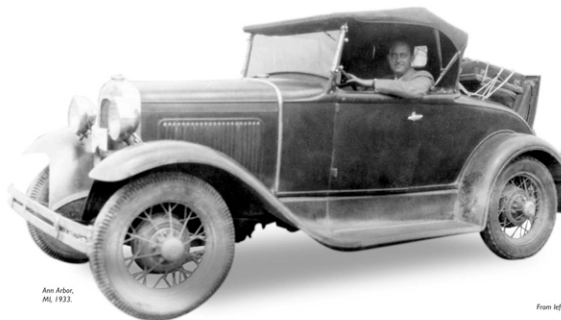
Fermi on Monte Cino, 1923.



Fermi and Persico.



From right: Enrico Fermi, Enrico Persico, Emilio Segre, Ostia, 1927.



Ann Arbor, MI, 1933.



From left: Persico, Moena and Enrico Fermi, Monte Cino, 1923.



Enrico Fermi at the lake with friends.

From left: Emma Castellani, a friend, Libero Trevisani Len-Cinta, Cornelia Trevisani, with Fermi and Persico at the far right.



Seated from right: Fermi, Persico, Segre, Ostia, 1927.



A rough road.



Enrico and Laura Fermi, in front of the Coponi's, in the yellow bobbi Peugeot, Rome, 1928.



From left: Enrico and Laura Fermi, a friend and Enrico Persico.



From left: Maria Fermi, a friend and Enrico Monte Cino, 1923.

# Enrico Fermi



# Enrico Fermi

*e si vestivano le Alpi e gli Appennini*



Enrico with his sister Maria and Perisco.



Fermi (center) with friends.



From left: Sandro Cigani, an unidentified child, Enrico Fermi and Corrado Travasso, Mount Navisio, Cortina.



Fermi with friends.



Fermi and Perisco.



Fermi and Perisco.



Fermi and Perisco (far left).



Fermi (right) with Perisco and the skis.



From right: A friend, Fermi, Perisco, Laura Fermi, a friend and Adèle Ravetti.



From right: Perisco, Enrico, Maria Fermi, their cousin Emma Kindl and a friend.



Fermi (left) with a friend.



Fermi with his parents, his sister and Perisco. 1923.



An unusual image of Fermi.



Laura Fermi on the Dolomites.



Enrico and Laura Fermi.



Enrico Fermi keeping his ski poles in good shape.

# Enrico Fermi

*Mi sono f... i... d... a... u... z... a... t... o...*

*P.S. La cosa avrà il suo epilogo a luglio.*

After his degree, Fermi was awarded a scholarship to specialize abroad and went to the University of Göttingen, where Born, Heisenberg and Jordan were creating the new quantum mechanics.

In 1924, thanks to Volterra and Lorentz, he went to Leiden (Ehrenfest was there) with a grant from the Rockefeller Foundation, and then to Florence, at the University, with his appointment as professor of rational mechanics and mathematical physics, an appointment which was renewed the following year. In Florence in 1926 he wrote his fundamental work about the statistics of  $\frac{1}{2}$  spin particles, today called fermions. With Rasetti, who was an assistant at the Institute of Physics, he did experimental research on polarisation of the resonance light of mercury.

He won the competition, held for the first time in Italy, for the Chair of Theoretical Physics, at the University of Rome, and he started working there on 1<sup>st</sup> January 1927.

In Rome Rasetti, Amaldi, Segrè and Majorana set up a group with Fermi, the group of Via Panisperna, later to be joined by the young Bruno Pontecorvo from Pisa.

In the period from 1923 to 1931 Fermi published 53 theoretical works, one with Pontremoli and another with Persico; he wrote only six experimental publications, all written with Rasetti.

Rome became a centre for research and study for many students that later became important physicists: Bethe, Placzek, Peierls, Teller, Møller, Goudsmit, London and Bloch.

On 9<sup>th</sup> July 1928 he married Laura Capon, from a non-practising Jewish family. The wedding took place at the "Campidoglio", seat of the Governor, with a civil ceremony. Their children Nella and Giulio were born in 1931 and in 1936.

Fermi in Leiden during Einstein's visit to Ehrenfest, 1924.



Enrica and Maria Fermi with Ernesto Rasetti and friends. (Statistical view Maria Fermi's tutor for her thesis on the History of Religion.) 1922 (approx.).



From right: Segrè, Fermi and Rasetti at the Sapienza for a Degree.



From right: Fermi, Nella Capon and Franco Rasetti with Rita Brunetti. Access, 1925.



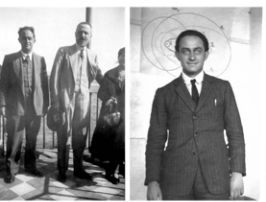
Enrica and Maria Fermi with their cousins Emma and Nelly Hamburg.

From left: Persico, Antonio Carlini, Fermi and M. Mozzicchi Lovroni, September 1930.



Fermi and Eduarda Amaldi (last on the left) with friends.

Fermi with his father-in-law Augusto Capon.



An original shot of Enrica Fermi.

Enrica and Laura's wedding in the Campidoglio. Behind the couple, Sandra Capon, to their right: Augusto Capon, Ono Maria Carlini, Franco Rasetti, Bianca Zibben, Paula and Caterina Capon, Anna Farbi. On their left: Anna Capon, Maria Fermi, Giorgio Parodi Rognoni, Giulio Zibben and other unidentified persons. Rome, 19 July 1928.



Laura Capon.



Enrica Capon, who collaborated with her sister Laura in translating "Atoms in the Family" into Italian.

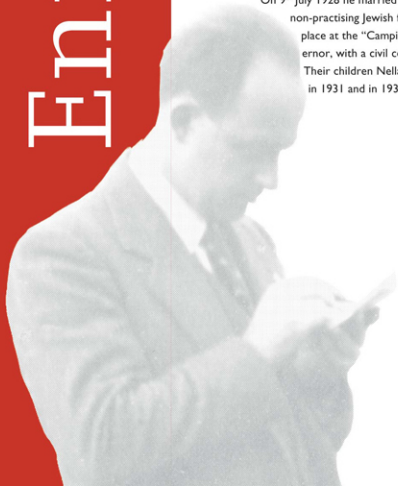


Enrica Fermi with her daughter Nella. 1931.



Laura Capon Fermi with her children Nella and Giulio. 1936.

A photograph of Fermi taken by Persico.





Mi sono f... i... d... a... u... z... a... t... o...

P.S. La cosa avrà il suo epilogo a luglio.

Fermi was invited to take part in international conferences: in June 1928 he went to Lipsia; in April 1929 to Paris, where he gave three lectures on quantum mechanics and to Zurich, at the Federal Polytechnic; in 1930 he was in Bucharest for three more lectures. He was invited for the first time to the United States at the University of Michigan to hold a course on the quantum theory of electromagnetic interactions. In 1931 he gave lectures in Hamburg, Paris, Leiden and Groningen.

His international fame was confirmed by the success of the Congress of Nuclear Physics that took place in Rome in October 1931. Many other important physicists took part in that congress: Millikan, Stern, Debye, Compton, Bohr, Curie, Sommerfeld, Heisenberg, Brillouin, Ehrenfest, Wataghin and together with Fermi the Italians Marconi, Corbino, Garbasso, Persico, Rasetti and Vallauri.

At that time American universities had very modern laboratories and more funds for research than Italian universities. For that reason in 1933 and 1935 Fermi went to Ann Arbor to teach at Michigan University.

His journey to South America (1934) where he gave lectures at the universities of Buenos Aires, Cordoba and San Paolo, was a pleasant break. During the journey home he met Ottorino Respighi with whom he talked about music despite the fact that the subject was of little interest to him. They had known each other since 1929, both being members of the Royal Academy of Italy. This journey changed mere acquaintanceship into warm friendliness.

In 1936 the Italian Ministry for Foreign Affairs offered Fermi the opportunity to give lectures in New York and in other important cities in the United States. He made arrangements with Columbia University in New York to hold a course during the summer of the same year. This was the beginning of his cooperation with this university, which became regular as from 1939.



From left: Enrico Fermi, Ivor Waller and William Webster Hansen at a summer school, University of Michigan, Ann Arbor, 1932.



Oath to the king 1927.



Oath to the King and to the Fascist Regime, 1931.



Massimo Giuseppe Fermi (last on the right) as member of the Royal Academy of Italy, 1929.



Fermi with friends.



Fermi and Rasetti



Nuclear Physics Conference. Fermi in the middle with Ehrenfest on the left. In the front row from left: Richardson, Millikan, Curie, Marconi and Bohr, Rome, 1931.



Fermi with Ottorino Respighi (musician) on board the liner "Caste Balciniana", 1934.

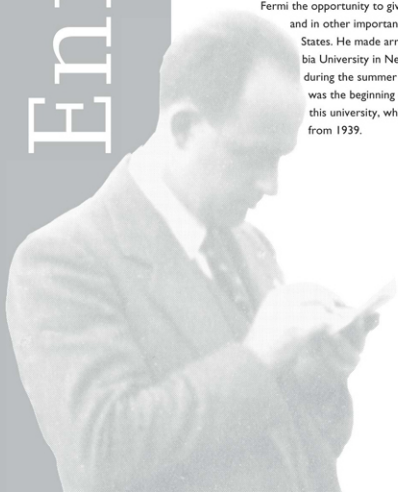


Fermi (far right) with Ehrenfest, Libermann, Casati and others, University of Michigan, Ann Arbor, 1930.



An official ceremony.

Enrico Fermi





Come ti ho già scritto alla fine di dicembre io partirò per New York; ma dovrò prima andare a Stoccolma per il premio Nobel.

In July 1938 the "Manifesto della razza" (a Fascist document upholding the alleged superiority of the Italian race) was published, discriminating against Italian Jews. Fermi, whose wife was Jewish, realised the danger for his family. So he decided to write to many American universities stating his willingness to hold courses.

The fundamental turning point arrived during the meeting at Copenhagen when Bohr tells him, confidentially, that he has been designated for the Nobel prize.

The Rector of the University, announcing to Bottai, Minister of Education the departure of Fermi for foreign countries, adds the declaration of his belonging to the Italian race and to the Catholic religion. Only his wife belongs to the Jewish race by birth.

On 11<sup>th</sup> November, the day the official news of the awarding of the Nobel prize was made public, the government approved a bill for the "defence of the race". Newspapers published the news as the front pages giving great emphasis to such measures as the prohibition of mixed marriages and the removal of Jewish employees from the civil and military administration of the State.

This news, that was to lead to the exile of many scientists such as Emilio Segrè and Bruno Pontecorvo, a very close collaborator of Fermi's, Bruno Rossi, Giulio Racah, Ugo Fano and many others, pushed the news of the Nobel prize into second place. The awarding of the prize to Fermi was not celebrated with the emphasis a nationalistic government would have normally given to such an important success for Italian science.

On 17<sup>th</sup> November Fermi asks permission to go to Stockholm to receive the Nobel prize.

Having to go through Germany by train, Fermi tried to take all possible precautions.

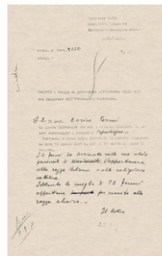
On 5<sup>th</sup> December, the day before their departure for Sweden, for the sake of appearances, Laura was baptised and they were remarried with a Catholic ceremony.

This fact was unknown to all, even to their children, and the only witnesses at the wedding were Ugo Amaldi with his son Edoardo and Ugo's daughter-in-law, Ginestra.

The telegram from the Minister Bottai, authorizing his departure for Stockholm arrives on 10<sup>th</sup> December, the day of the prize-giving, but Fermi had already left.



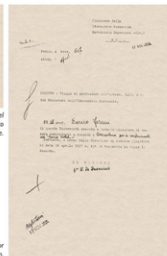
Fermi's request for authorization to travel to Copenhagen (where Niels Bohr had informed him that he was to receive the 1938 Nobel Prize).



Permission of the Minister of Education for Fermi's trip to Copenhagen. Authorization which depended on the positive impression expressed by the Cabinet and Ministry of Foreign Affairs.



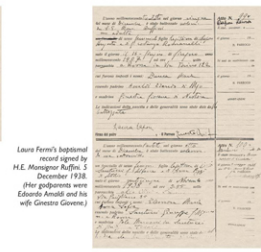
Fermi's request for travel authorization to Stockholm to receive the Nobel Prize.



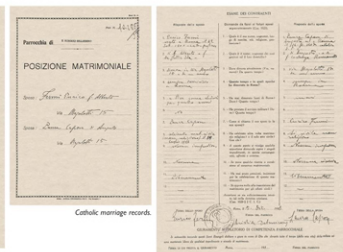
Authorization for Fermi's trip to Stockholm.



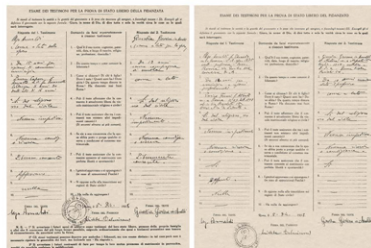
Telegram from Minister Bottai (one of the most ardent supporters of racial persecution) with a hand written note stating that Fermi had already left for Stockholm: 10 December 1938.



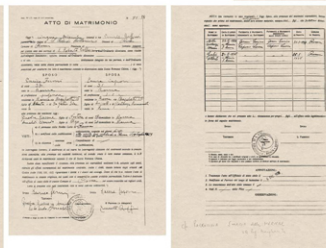
Laura Fermi's baptismal record signed by H.E. Moninger Ruffini: 5 December 1938. (Her godparents were Edoardo Amaldi and his wife Ginestra Goveani.)



Catholic marriage records.



Catholic marriage records.



Explication of the Fermi children following the Catholic marriage.

- ① Centere della Sera "Recentissime" 11 November 1938.
- ② Centere della Sera 13 November 1938.
- ③ Centere della Sera 13 December 1938.



Il Messaggero, 11 November 1938.

In August 1938 Fermi, shocked by the "Manifesto della razza", applied to four American universities and received five offers. He chose the offer from Columbia University in New York, where he had been a visiting professor in 1936. In 1937 Columbia University had invited him again but Fermi had refused because of the research he was doing in his laboratory in Rome in Via Panisperna.

The documents shown here demonstrate that Fermi and Columbia University had agreed to an exchange of letters written for the sole purpose of obtaining from the Italian Government permission to leave the country on temporary leave from the University of Rome. In the letters there is also a request to the American Embassy for an entry visa for temporary immigration for Fermi's family.

In the letter written from Belgium, Fermi's concern to supply Columbia University with a list of the names of Italian physicists who had lost their jobs because of racial discrimination is of great moral significance.

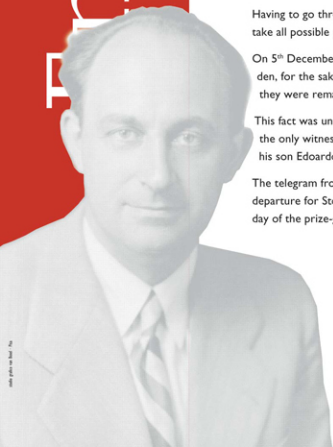
From New York Fermi tried to keep his position at the University of Rome as long as possible, asking many times for further temporary leave so as not to show the Italian Government that his departure was final.

He did not want to cause any further damage to the group of Via Panisperna that had already suffered many losses: Segrè, Pontecorvo (who were Jewish) and Rasetti had taken refuge in America.

But American newspapers brought all his efforts to nought: the day after his landing in America, the New York Herald Tribune published a long article announcing the arrival of the important Italian physicist who had left his own country because of the racial policy of the Fascist regime.



Enrico Fermi





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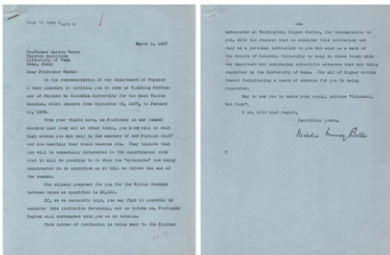
Enrico Fermi  
With the three objects in his hands, Enrico rotated his torso backward, up the four steps and across the stage, because to rotate you must cover your feet. So, without even looking over his shoulder, naturally aware of himself he found his way to his brother-in-law's chair and happily dropped into it. Of this feat he was to brag for years to come.



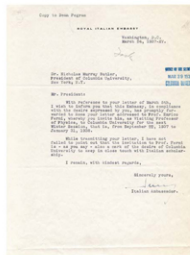
Fermi at the Nobel ceremony



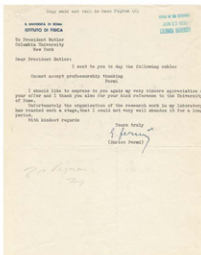
King Gustav V of Sweden presenting the Nobel Prize to Fermi



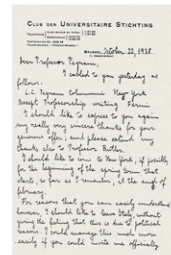
Letter from Nicholas Murray Butler, President of Columbia University, to Fermi inviting him as visiting Professor for the winter session at the University. 5 March 1937.



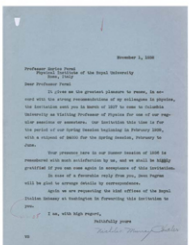
Letter from the Royal Italian Embassy in Washington to Butler confirming that his request had been forwarded to Fermi. 24 March 1937.



Letter from Fermi to Butler declining invitation to Columbia as he did not want to abandon his work for a long time. 6 June 1937.



to leave at Stoccolma through the Italian Embassy in the U.S. It would be useful to understand in detail the request that it would be a personal appointment in order to get a new passport, for example, and my family. I should need letters on official letter from Columbia stating that it was appointed as professor and mentioning the salary. In case that you cannot write me through the Italian Embassy, send me only the formal letter. I should like to see to the point of finally for the appointment of the spring term, as far as I remember, at the range of February. The reason that you are really undecided, I should like to see the point of finally for the appointment of the spring term, as far as I remember, at the range of February. I should like to see the point of finally for the appointment of the spring term, as far as I remember, at the range of February.



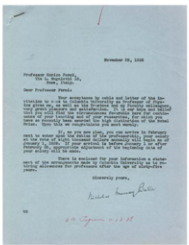
Butler's letter to Fermi inviting him to Columbia for the 1938 spring session. 1 November 1938.



Fermi's telegram to Butler declining invitation. 3 June 1937.



Fermi's acknowledgment to Butler for the invitation stating he would arrive in New York on 2 January 1938.



Butler's letter to Fermi showing pleasure in having accepted his return to Columbia. 22 November 1938.



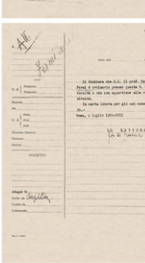
Article opposing in the New York Herald Tribune of 23 February 1939 reporting on Fermi's decision to leave Italy due to anti-semitic laws.



Article appearing in Time of 23 February 1939 reporting on Fermi's recent discovery.



Article appearing in Science of 23 February 1939 reporting on Fermi's recent discovery.



The Ministry of Education's correspondence to Fermi related to his request of special leave from the university for family reasons, acceptance of the same, and final discharge starting from 29 February 1940.

...my request for theoretical physics from the Ministry of Education... I should like to see to the point of finally for the appointment of the spring term, as far as I remember, at the range of February. I should like to see the point of finally for the appointment of the spring term, as far as I remember, at the range of February.

Letter from Fermi (in Belgium) to Pegram accepting offer from Columbia and asking no publicity be made to the fact that he was not in a favorable position, to avoid that other Italian colleagues suffer from his decision (forming names of some and asking that they be helped). 22 October 1938.

...the Italian physical that have left the position on account of recent events... I should like to see to the point of finally for the appointment of the spring term, as far as I remember, at the range of February.

Letter from Fermi (in Belgium) to Pegram accepting offer from Columbia and asking no publicity be made to the fact that he was not in a favorable position, to avoid that other Italian colleagues suffer from his decision (forming names of some and asking that they be helped). 22 October 1938.

