LA SCOPERTA DEL TECNETO: LA STRUMENTAZIONE SCIENTIFICA UTILIZZATA DA SEGRÈ E PERRIER PER L'IDENTIFICAZIONE DELL'ELEMENTO 43

THE DISCOVERY OF THE TECHNETIUM: THE SCIENTIFIC INSTRUMENTS USED BY SEGRÈ AND PERRIER FOR THE IDENTIFICATION OF THE ELEMENT 43

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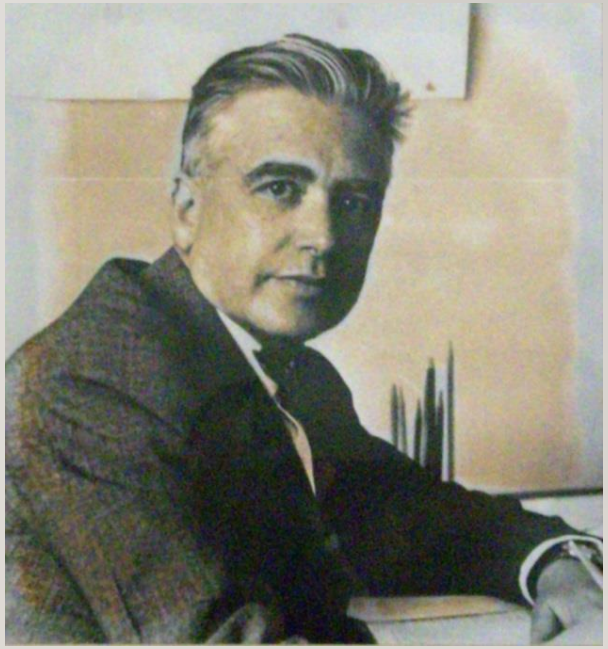
1937, Palermo: La scoperta del TECNETO

Palermo, 18.02.2019

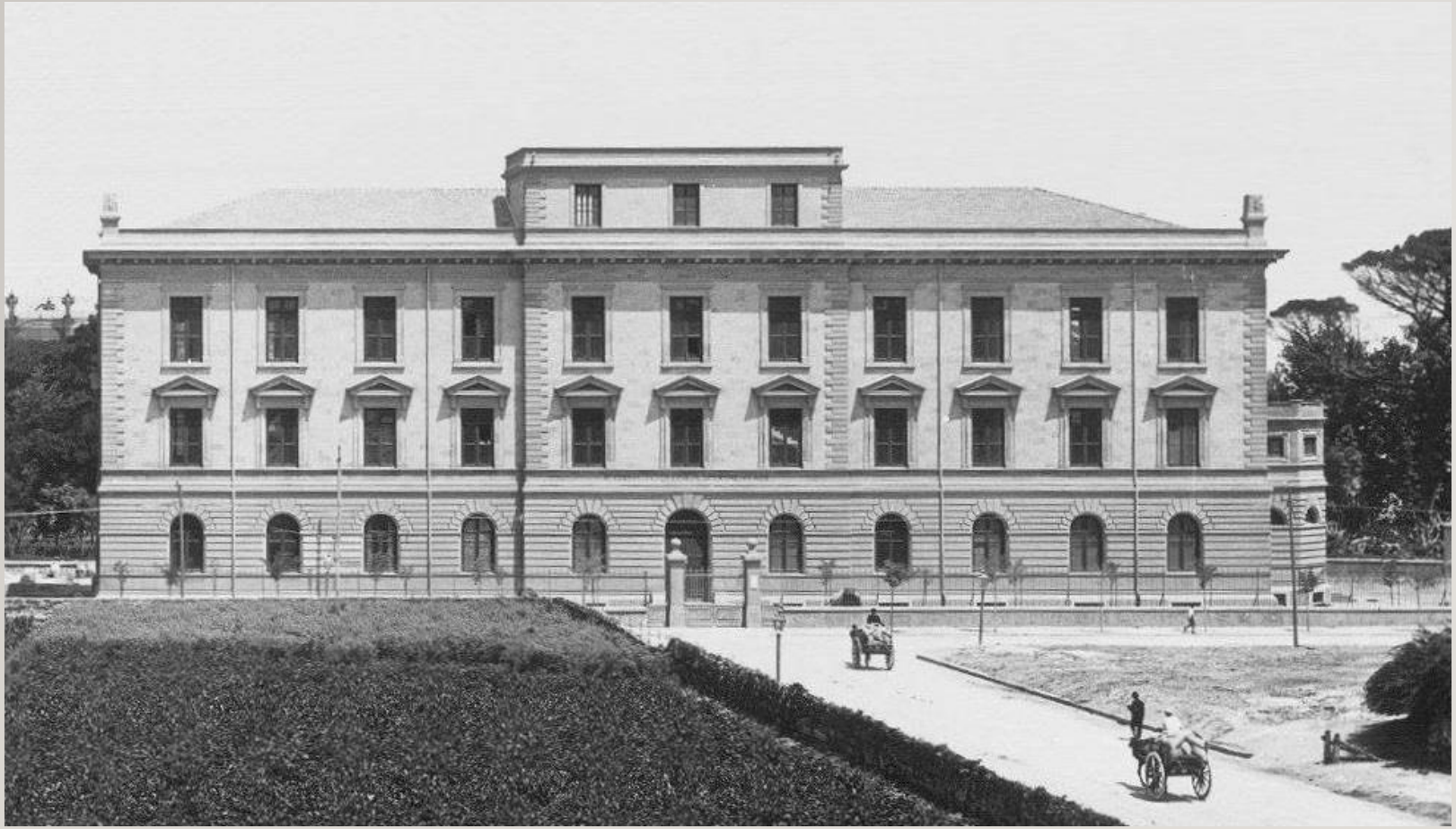
Carlo Perrier and Emilio Segrè

Carlo Perrier, chimico e mineralogista Torinese, era già dal 1929 responsabile del Gabinetto di Mineralogia sito nei vecchi locali del Palazzo dell'Università, ex sede dei Padri Teatini di via Maqueda. Fra il 1932 e il 1933, si trasferisce in via Archirafi e diviene direttore del neonato Istituto di Mineralogia. Circa un anno dopo, anche l'Istituto di Fisica si trasferisce in via Archirafi, e a causa della prematura scomparsa di Michele La Rosa, Direttore dell'Istituto di Fisica e Rettore dell'Ateneo palermitano, Carlo Perrier dirige l'Istituto di Fisica fino al 1935. (Annuari Università di Palermo)



Nel 1935 **Emilio Segrè** si trasferì ha Palermo dopo avere vinto la cattedra di Fisica. A Palermo Segrè trovò «*un Istituto privo di attrezzature adatte a qualsiasi indagine di Fisica moderna*. *Mancava anche il personale docente, anche se qualche studente - come Mariano Santangelo (1908-1970) e Ginetta Barresi - sembrava promettente*».

THE HISTORICAL INSTITUTES OF «FISICA» AND «MINERALOGIA»



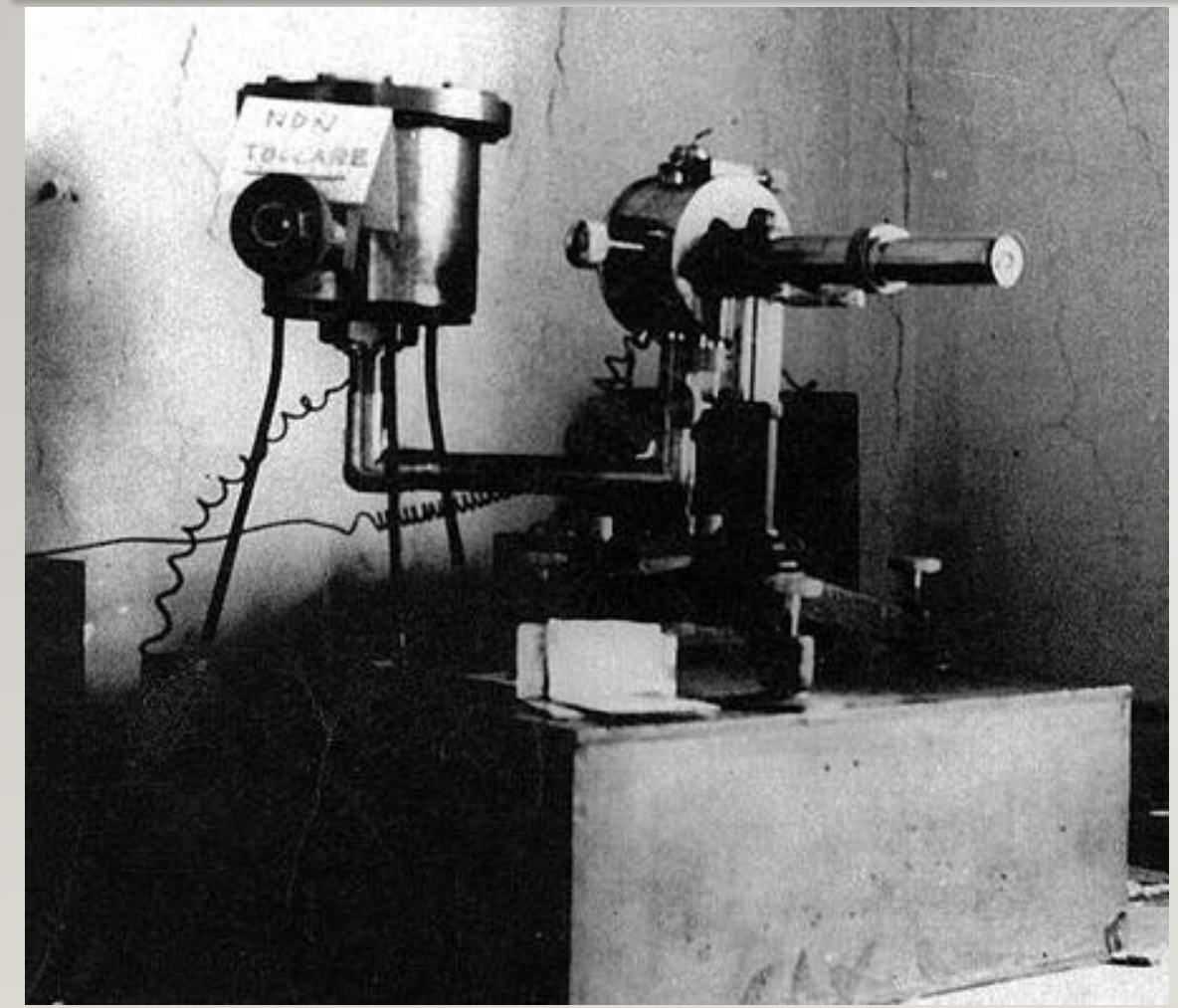
The Institutes of via Archirafi 36 are directed by Emilio Segrè and Carlo Perrier, and an important scientific collaboration starts that will lead to the discovery of the element 43.

When Segrè arrived in Palermo, he found:
«*very large rooms, waste space, and instruments and tools of the previous century or missing at all*».

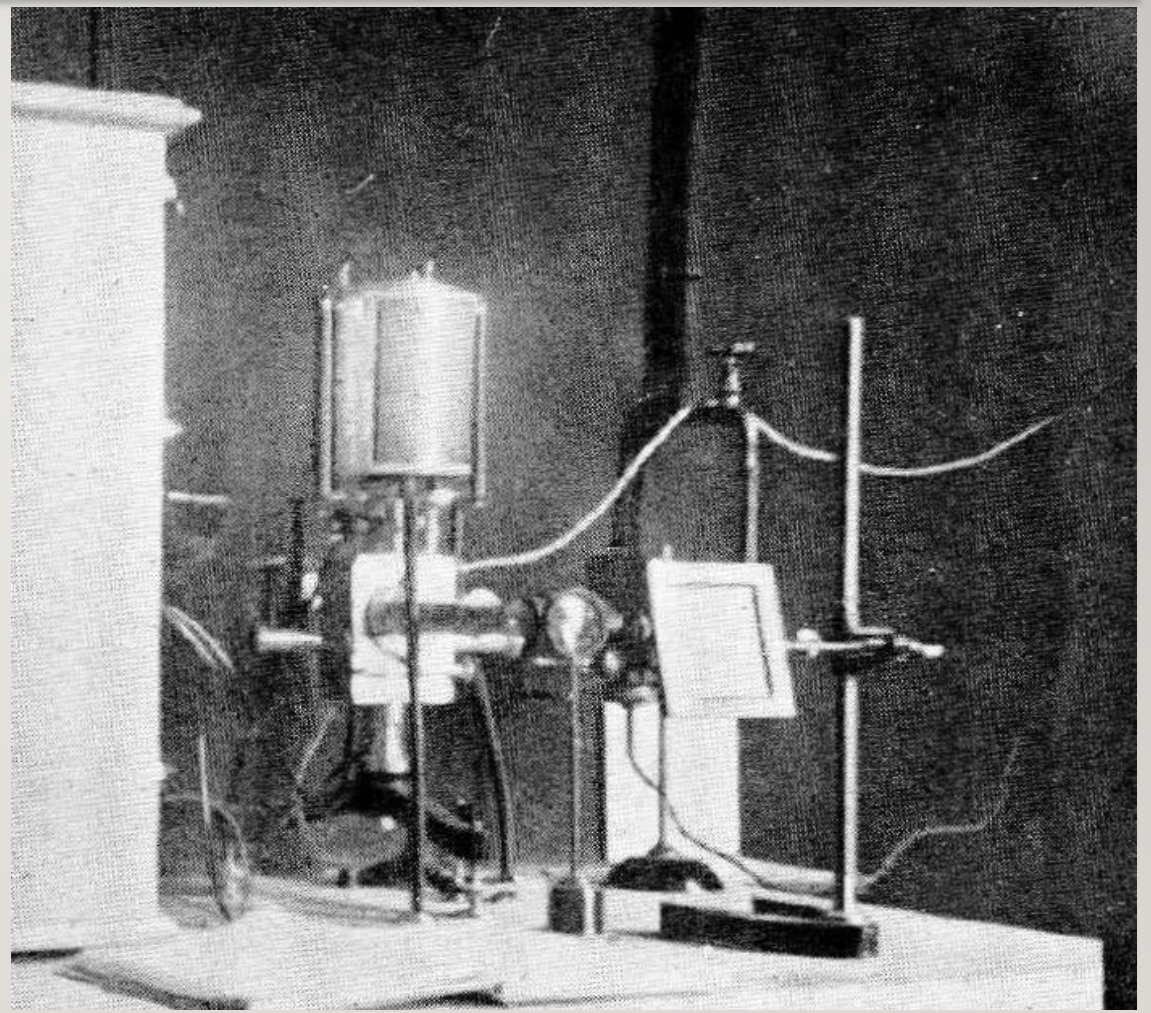
E. Segrè, *Autobiografia di un fisico*, Bologna 1995

THE NEW «R. ISTITUTO DI FISICA SPERIMENTALE»

The experimental apparatus

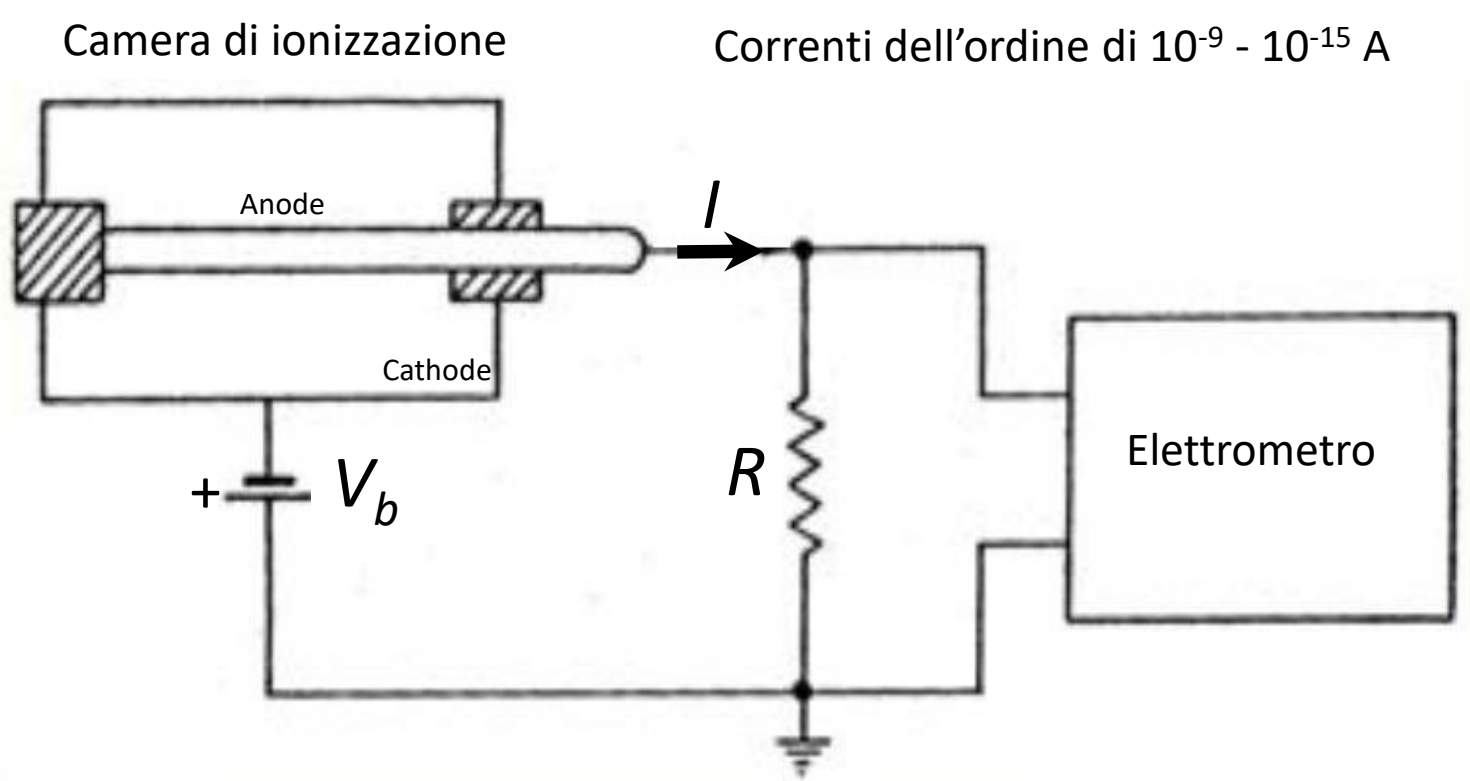


https://www.phys.uniroma1.it/DipWeb/museo/home.htm



F. Ferla, *Chimica radioattiva,* Sapere **124** (1940) 3-7

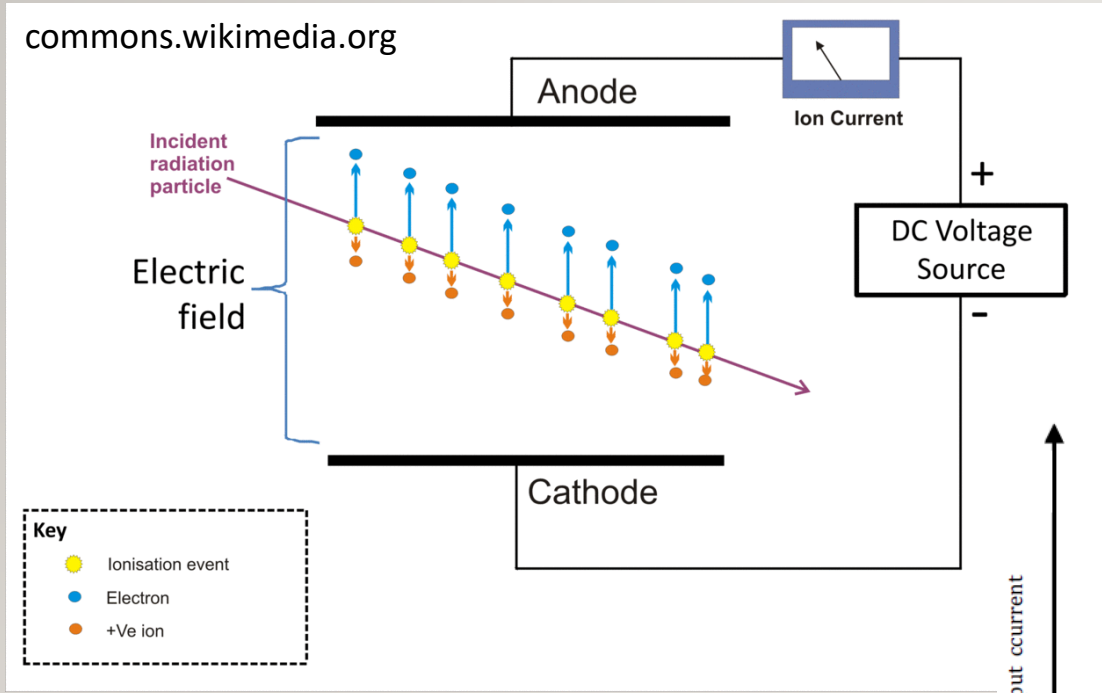
SCHEME OF THE EXPERIMENTAL APPARATUS

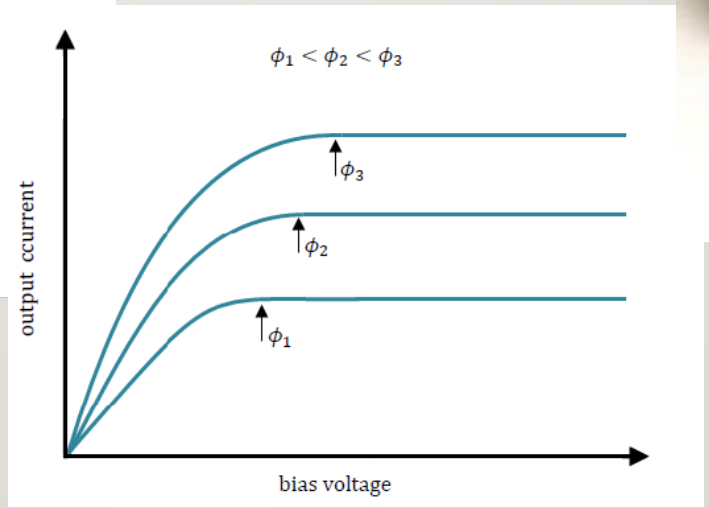


Syed Naeem Ahmed, *Physics and Engineering of Radiation Detection*, Elsevier 2007

La **camera a ionizzazione** è un rivelatore di particelle a gas. Il suo funzionamento si basa sulla capacità che una particella carica attraversando un gas ne provochi la ionizzazione.
Se il gas, inoltre, si trova in un campo elettrico (cioè tra due elettrodi), allora gli ioni e gli elettroni creati migrano verso gli elettrodi di segno opposto generando una corrente come effetto della scarica degli ioni sugli elettrodi.

THE IONIZATION CHAMBER

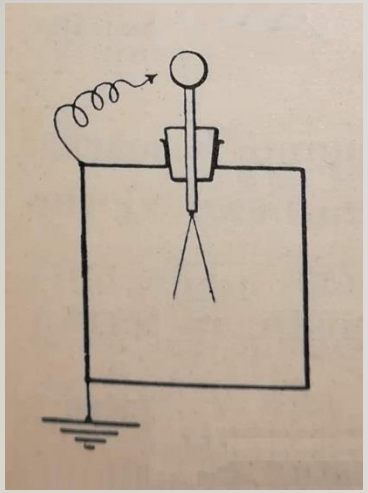


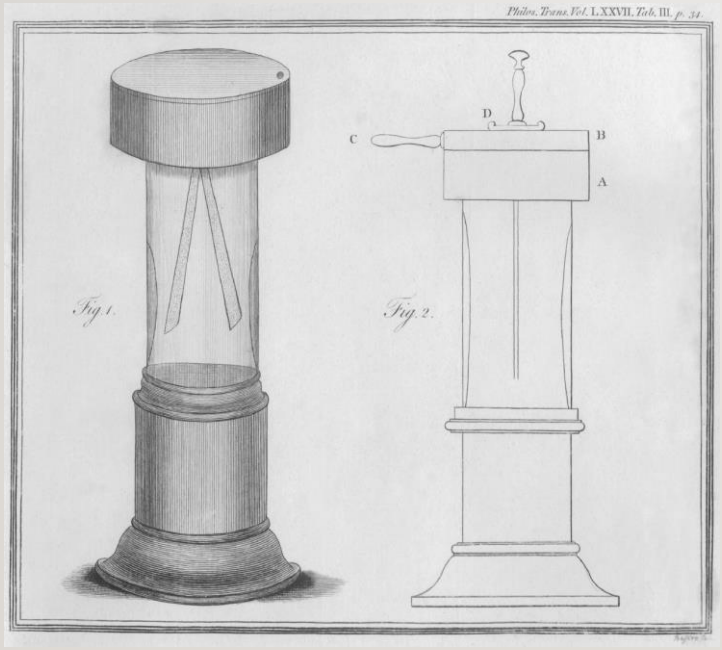


Syed Naeem Ahmed, *Physics and Engineering of Radiation Detection*, Elsevier 2007

THE ELECTROMETER

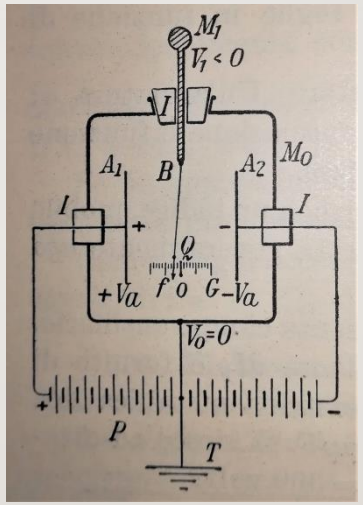
An electrometer Is a device for measuring electric potential. It derives from the classic gold leaf electroscope, described for the first time in 1787 by Abraham Bennet, a clergyman and man of science.





A. Bennet, *Description of a new electrometer*, Philosophical Transactions of the Royal Society of London **77** (1787) pp 26-31 and pp 32-34

In the thread electrometer with auxiliary field, the gold leaves are replaced by a metal-coated quartz fiber, whose slight movements can be better measured with a micrometric microscope.



E. Perucca, *Fisica Generale e Sperimentale. Ottica elettricità e magnetismo*, Vol. II, UTET Torino 1932, pp 424-429

THE DISCOVERY OF ELEMENT 43

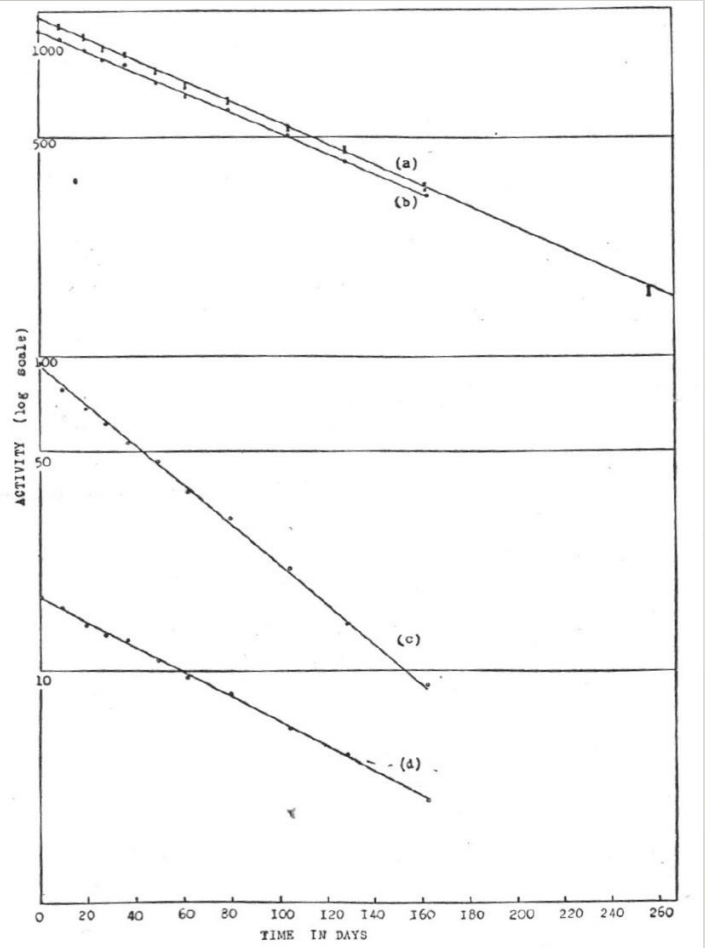


FIG. 1. (*a*) Decay curve of the activity of radioactive isotopes of element 43. (*b*), (*c*), and (*d*) Plot of the amplitude of the three component activities as a function of time.

$$y = 1082\ exp\ (-491\ x - t/130) + 100\ exp\ (-90\ x - t/72) + 16.7\ exp\ (-2.6\ x - t/118);$$

y = attività:
x = spessore assorbente in g/cm² *Al*;
t = tempo in giorni.

Abbiamo così 3 componenti con periodi di dimezzamento di 90; 50; 80 giorni e spessore di dimezzamento di 1.4; 7.65; 264 mg/cm² *Al* rispettivamente.

B. N. Cacciapuoti and E. Segrè, *Isotopi radioattivi dell'elemento 43*, La Ricerca Scientifica (1937) 149-151

B. N. Cacciapuoti and E. Segrè, *Radioactive Isotopes of Element* 43, Phys. Rev. **52** (1937) 1252-1253

THE HISTORICAL COLLECTIONS OF FISICA AND MINERALOGIA

After a long period of abandonment, the historical Collections of **Fisica** and **Mineralogia** are today cured and well preserved in the historical building of via Archirafi 36, and they are managed by the "**Dipartimento di Fisica e Chimica**", and the "**Dipartimento di Scienze della Terra e del Mare**".

The collections are today *lively spaces*, accessible to visitors and students (primary, secondary schools, and college), and actively involved in cataloguing, restoring and renovating projects, aimed to enhancing the precious, material and immaterial, cultural heritage of the University of Palermo.

The building of the historical Istituti di Fisica and Mineralogia of via Archirafi 36

THE HISTORICAL COLLECTION OF PHYSICS INSTRUMENTS

The **Historical Collection of Physics Instruments** is located at the first floor of the historical building of via Archirafi 36.

The oldest instruments date back to the early 19th century, when experimental Physics began to be taught in the University by using instruments and apparatus.

The Collection today consists of more than 500 items.

Showcases containig instruments

THE HISTORICAL COLLECTION 'MUSEO DI MINERALOGIA'

The **Collection "Museo di Mineralogia"** is located at the second floor of the historical building of via Archirafi 36.

The collection contains thousands of precious and rare specimens of Sicilian and worldwide minerals, rocks from wild place of the planet, and meteorites from the space. A consistent collection of historical instruments for research and didactic purposes.

The Collection today consists of more than 7000 items, but cataloguing works are in progress.

Photo Sergio and Antonio Calabrese

Ionization Chamber

Photo Sergio and Antonio Calabrese

Ionization Chamber: details

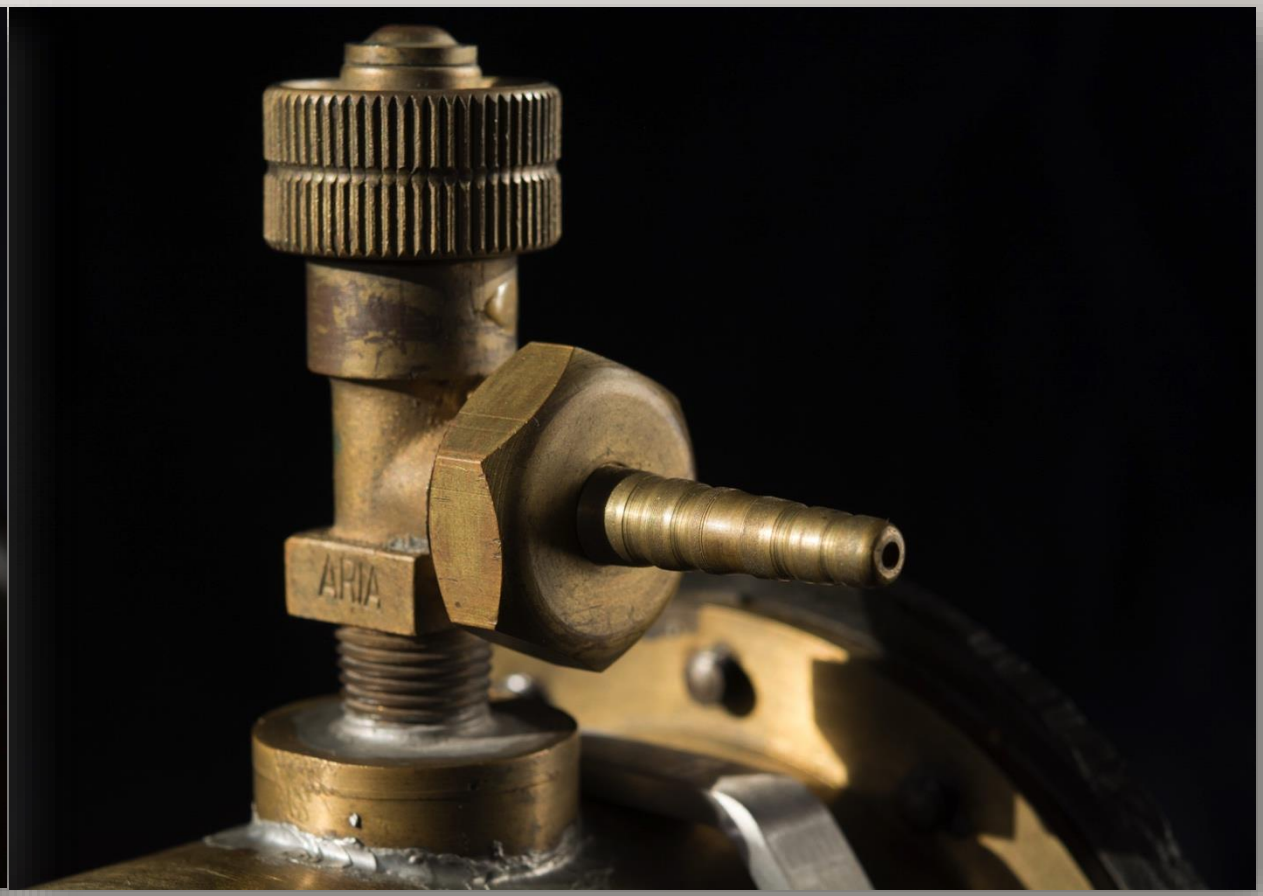


Photo Sergio and Antonio Calabrese

Perucca-type Electrometer: details

Photo Sergio and Antonio Calabrese

Perucca-type Electrometer: details

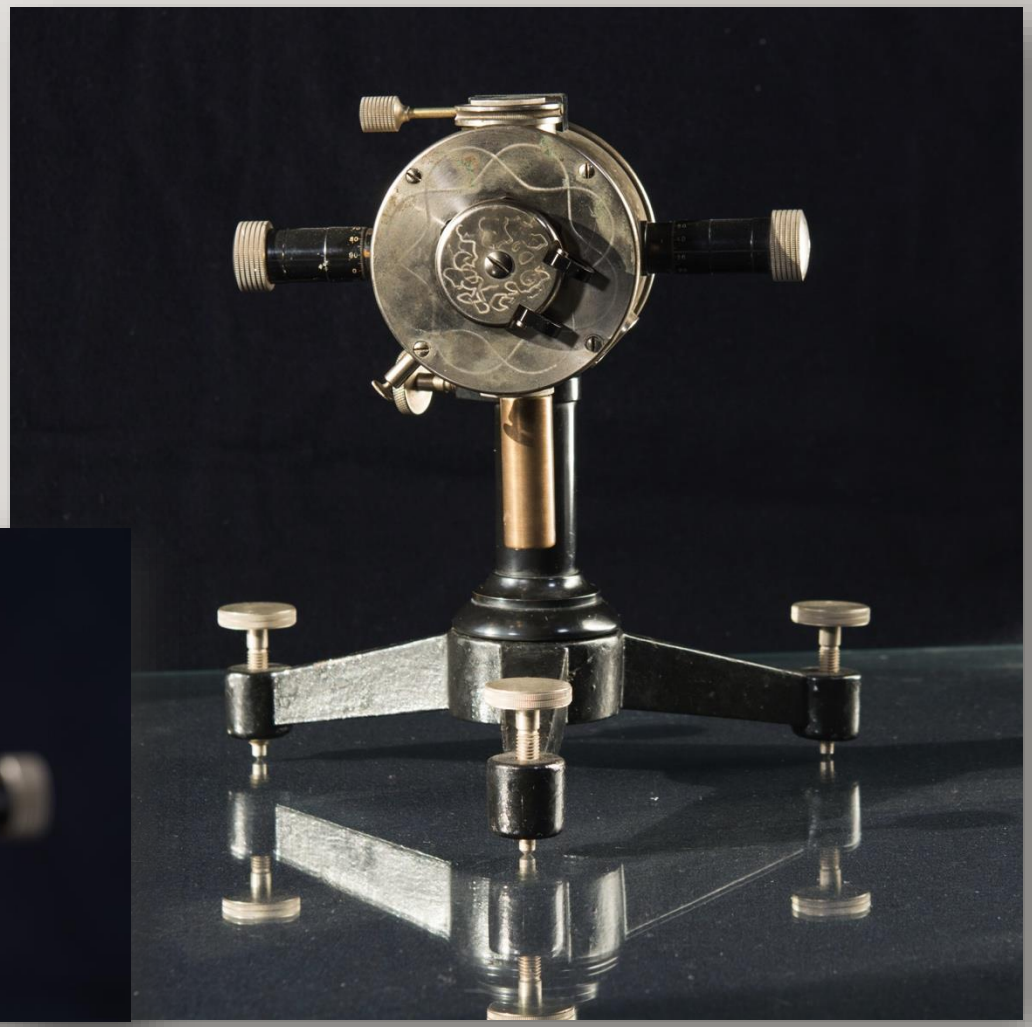
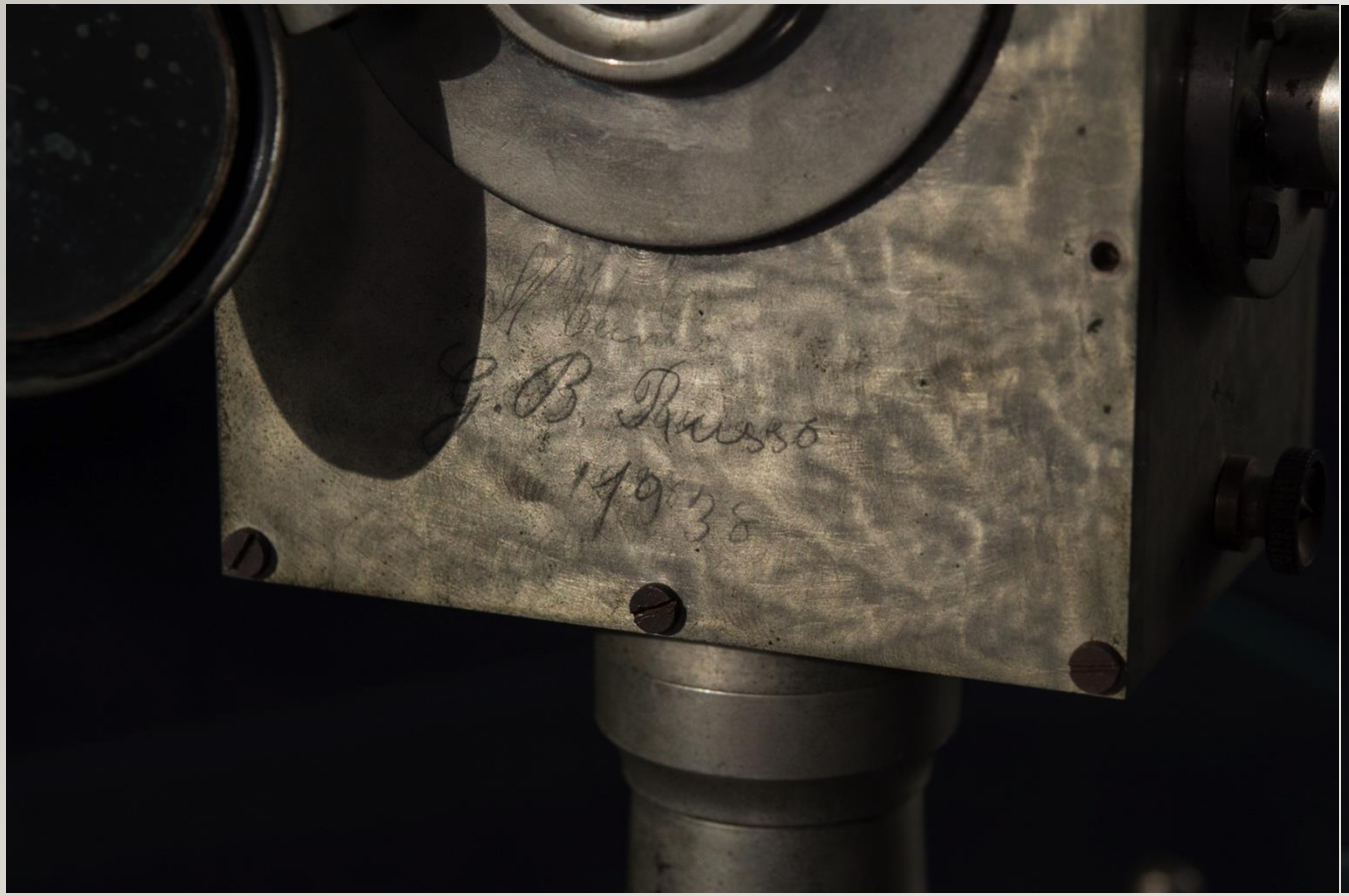


Photo Sergio and Antonio Calabrese

Wulf-type Electrometer

Photo Sergio and Antonio Calabrese

Wulf-type Electrometer: details



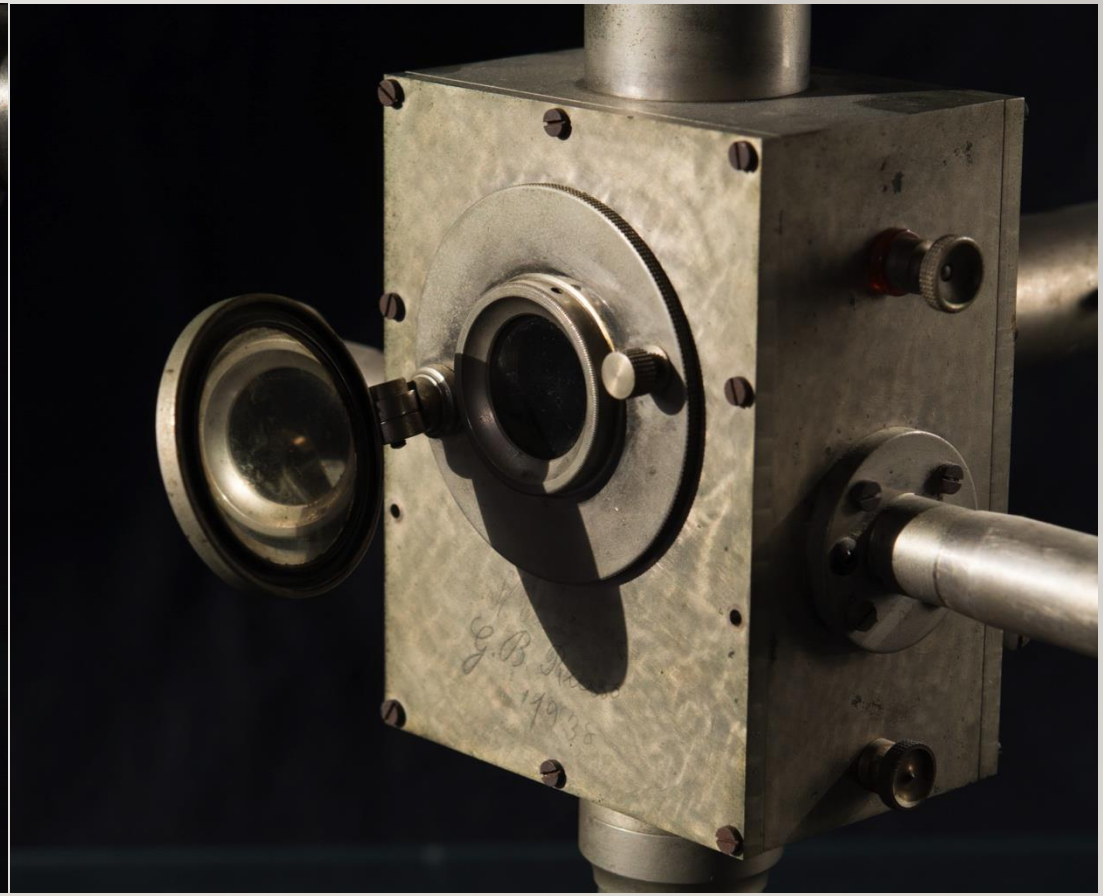
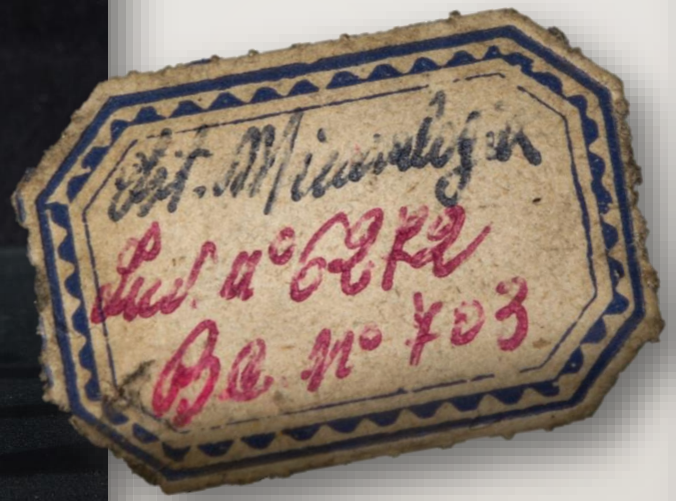


Photo Sergio and Antonio Calabrese

Ionization Chamber

Photo Sergio and Antonio Calabrese

PERUCCA-TYPE ELECTROMETER



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Perucca-Type Electrometer: details

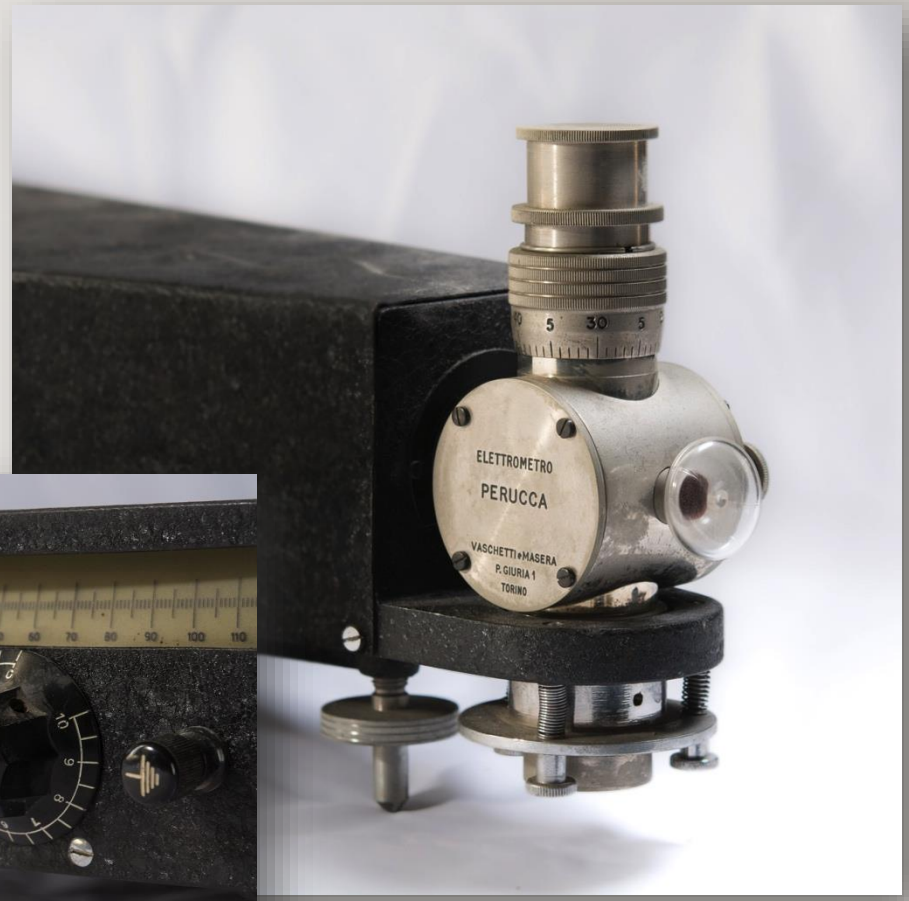

Photo Sergio and Antonio Calabrese

The experimental apparatus: further instruments

Photo Sergio and Antonio Calabrese

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- nationalmaglab.org

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