

The Scientific Historical Heritage in the Physics Museum of the University of Naples

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A guided tour of the Collection is offered to visitors, providing the characteristics of individual instruments of historical interest.

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The Physics Museum is a fairly recent institution. It came into being in a somewhat roundabout way thanks to a group of researchers at the Institute of Physics at Naples' Federico II University. They decided to take charge of all the scientific instruments of historical interest.

The Museum is situated at number 8, Via Mezzocannone, in the historical University Building (Fig.1 & Fig.2). The instrument collection at the Physics Museum is of enormous historical and scientific interest. It comprises approximately seven hundred pieces, mainly acquired in the 18th century and the early years of the 20th from instrument makers in England, France and Germany. There are also a number of interesting prototypes of equipment made by Italian instrument makers¹.

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Fig. 1 Physics Museum Entrance



Fig. 2 An interior of the Museum; on the left Atwood's Machine, on the right, a painting by the Siennese artist Marco Pino, XVI Century

The main part of the collection in the Physics Museum comes from the University's *Gabinetto Fisico*. To get an idea of the importance of the institution in the nineteenth century, we should bear in mind the role played by instruments in the creation of empirical scientific knowledge.

It is generally held that the work of a scientist consists in setting out systems of thought regarding nature, and that the main fruit of this activity is scientific publication. In fact, not only were they involved in communicating their theories by means of the written word, but they were also productive in practical terms².

The main illustration of this is the creation of scientific collections like this one. The instruments making them up are extremely informative, as they reflect political choices and particular economic conditions.

Their story is also linked to that of the craftsmen who built them. They were luxury items, sometimes even works of art, especially during the sixteenth and seventeenth centuries, when collecting was something of a fashion. They were to become more functional in the eighteenth century with the beginnings of a didactic approach to experimental physics.

This new way of teaching was a consequence of the rebirth of scientific thought, which, especially following Newton's example, hailed knowledge as gained through observation, firmly rejecting any deductive reasoning based on hypothesis.

From 1806 and during the ten years of French control in the Kingdom of the two Sicilies, Bonaparte and Joachim Murat set up important scientific centres in Naples, which are still active today, such as the Mineralogy Museum and the Zoological Museum, both at number 8, Via Mezzocannone, and the Botanical Gardens in Via Foria, which together with the Physics Museum are now part of the Federico II University Museums³.

The *Gabinetto Fisico* was founded by Royal Decree in 1811 and annexed to the existing Chair in Experimental Physics, directed by Gennaro De Conciliis, who was succeeded by Giovanni Gambale, Mario Giardini and Giuliano Giordano until 1850⁴. The *Gabinetto* was housed in a few rooms near the *Teatro Chimico*, in the old spice rooms of the Jesuit *Collegio Massimo*. The current Physics Museum occupies the refectory and the kitchens of the former Jesuit College.

The building, dating back to 1593, was taken over to house part of the university upon the dissolution of the Jesuit order in 1776. The College included the buildings between Via Mezzocannone and Via Palladino. Ora è sede del Rettorato e dei Musei universitari.

The *Gabinetto Fisico* became autonomous only in 1818 and the first equipment occupied only a few rooms.

It was mainly conceived in the context of eighteenth-century research and teaching needs, including several prisms, mirrors and optical games from the scientist de Conciliis's collection. The core collection also contains a number of kaleidoscopes, and an anamorphosis, a graphic mirror and the double burning lens (fig.3) made by Brander and Holscher, a famous instrument-maker from Augsburg. In the years to follow, whole collections of instruments belonging to Neapolitan scientists of the previous century were added, such as those of Antonio Caracciolo di Brienza, whose *beautiful English mirror*, as it is listed in the inventory, is still in the collection (fig. 4).



Fig. 3 Double Burning Lens
Brander and Holscher XVIII century



Fig. 4 English Mirror
XVIII century

For the seventh Congress of Scientists, held in Naples in 1845, the *Gabinetto Fisico* acquired further rooms, beneath those already in use, to house the great induction machine constructed by Giardini himself, now lost, and the three Gambey compasses, coming from the Royal Palace and granted to the university by Ferdinand II.

While Giuliano Giordano was in charge, a number of instruments were purchased from Macedonio Melloni's widow, among which is the Thermopile constructed about 1835 by Gourjon, an instrument-maker of the *École Polytechnique*.⁵ (fig.5).



Fig. 5 Thermopile
A.Gourjon, Paris 1835.



Fig. 6 Macedonio Melloni
*Courtesy of Dipartimento di Fisica
Università di Parma*

The first research into thermal radiation in the 1830s was carried out by Macedonio Melloni (fig.6), who was nicknamed *the Newton of Heat* by his contemporaries. He was a liberal, and had taken part in uprisings in his native town of Parma in 1830 and was consequently banished, seeking exile in France. His heat experiments using instruments of his own invention made him world

famous⁶. His banishment order was lifted in 1837 and he accepted the position of director at the Naples Institute of Meteorology - now the Osservatorio Vesuviano⁷ (fig.7, fig.8). He was dismissed from his academic position, accused of taking part in the 1848 uprisings, and moved to Portici, outside Naples, a seaside resort 10 km south of Naples, where he died in 1854.



Fig. 7 Osservatorio Vesuviano
Gouache, *Courtesy of Osservatorio Vesuviano*



Fig. 8 An eruption of Mt Vesuvius
Gouache.
Courtesy of Osservatorio Vesuviano

Among the apparatus belonging to Melloni, the large Fresnel lens made in Paris by Henri Lepaute in 1845 (fig.9), can still be seen in the Physics Museum.

This apparatus was used to measure the radiating power of the Moon, disproving an old theory about the existence of cooling rays⁸. You can also see an electroscope invented by Melloni, better equipped to maintain its electric charge. The instrument with the inscription '*Latest Discovery of Cavalier Melloni*' was sold to Ferdinand II to enrich his private museum of scientific instruments (fig.10).



Fig. 9 Large Fresnel Lens
H. Lepaute, Paris 1845



Fig. 10 Electroscope
S. Gargiulo, Naples 1854

Under the direction of Gilberto Govi, the *Gabinetto Fisico* changed considerably. It had new apparatus, especially high-precision instruments. The physics sector which most benefited from upgrading was the electrical

instruments section. Beyond beginning his own line of research, Govi dedicated himself to transforming the institution into a modern research laboratory.

In 1889, Emilio Villari became the new professor of experimental physics and director of the *Gabinetto Fisico*. Naples-born, he studied in Florence and completed his studies in 1864 at the University of Berlin, where Gustav Magnus had opened up his private laboratory to young scientists, giving rise to a tradition of collaboration between academics in different countries, some of whom would go on to make a name for themselves.

Villari studied the relationship between the magnetisation of iron and variations in the magnetic field.

His findings were the result of work begun years before in 1865 on the magnetic susceptibility of iron under mechanical tension. You can see his quadrant electrometer which he designed and kept in the Museum, and which added a new element to Thomson's well-known differential apparatus. It is an electromagnetic brake which reduces the period of oscillation of the suspension system and allows faster, and above all, more regular readings.

You can see a rheometric compass, another device of Villari's (fig.11), built by the Neapolitan craftsman Giuseppe Caputo. It was used to measure currents of widely differing intensities.



Fig. 11 Rheometric Compass
G. Caputo, Naples 1890

The wealth and the importance of the Collection of the Physics Museum is due above all to the fact that the *Gabinetto Fisico* inherited, with the unity of Italy and with the end of the Bourbon monarchy in 1860, the scientific instruments that were in the Royal Palace in Naples. We have two rare telescope objective lenses from the Royal Collection, one made by Evangelista Torricelli in 1645 (fig.12), and the other by Domenico Selva (fig.13) at the beginning of the eighteenth century.



Fig. 12 Telescope Objective Lens
E. Torricelli, 1645



Fig. 13 Telescope Objective Lens
D. Selva, XVIII Century

The documentary history of this Collection, the nucleus of which you can admire in the Physics Museum, is of particular interest because in 1995 it brought to light the existence of a collection of physics instruments hitherto thought lost⁹. The story of the Collection is related to the arrival in Naples in 1734, of Carlos, the son of Philip V of Anjou-Bourbon and Elizabeth Farnese, as king of Naples and Sicily. Soon after, pictures, manuscripts, documentary archives, parchments, medals and cameos inherited from Carlo's mother began to arrive in Naples. Together with these *objets d'art*, four crates of '*different mathematical machines*' were transported from Parma¹⁰. You can see the art and archaeological treasure from this magnificent collection at the Museum of Capodimonte, in Salita Moiarriello, and at the Museo Nazionale in Via Foria.

The surviving inventories that have come down to us attest to the wealth of the Royal Collection. There is an inventory in the State Archives in Piazza Grandi Archivi without an actual date but traceable back to 1845, listing three-hundred-and-three instruments, organised in twenty-four cabinets, carefully describing them with their measurements. The 1879 inventory recorded one-hundred-and-sixty-one in the Naples Heritage Authority lists. Lastly, the 1887 inventory, preserved in the Physics Museum, listed one-hundred-and-seven instruments surrendered to the university's *Gabinetto Fisico* in 1887.

No visit to the Museum is completed without admiring the compound microscopes built by Amici of Modena (fig.14) and the *Microscope Achromatique perfectionné par Vincent Chevalier* (fig.15).



Fig. 14 Microscope
G.B. Amici, Modena 1825



**Fig. 15 Compound
Microscope**
E.M. Clarke, London 1835

Scientific instruments can be admired in other important Neapolitan institutions such as the Osservatorio Vesuviano, the Osservatorio Astronomico di Capodimonte, the Città della Scienza and the Museo del Mare.

References

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⁴ For a brief exposition of the history of experimental physics in Naples, see: E. Schettino, *Fisica in La cultura scientifica e le sue istituzioni, 1860-1915*, Paparo Edizioni, Naples 2001. 141-149.

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