

The Physics Cabinet from the University of Würzburg

An Exhibition at the Bayerisches Nationalmuseum in Munich

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From Würzburg to Munich

From 5 June 2025 to 11 January 2026, the Bayerisches Nationalmuseum in Munich shows the studio exhibition 'Thirst for Knowledge and Enlightenment. The Physics Cabinet from the University of Würzburg' (Wissensdurst und Aufklärung. Das Physikalische Kabinett der Universität Würzburg), which features around 45 objects from the aforementioned collection (Fig. 1).¹ As unknown as this cabinet is today, the exhibits have been in the museum's possession since 1877. In that year, the university under Friedrich Kohlrausch (1840–1910) – the predecessor of Wilhelm Conrad Röntgen as professor of physics – sold numerous objects from the Physics Cabinet that were no longer in use and considered worthless. On 23 January 1877, a curator from the museum travelled to Würzburg to select the pieces, which, according to estimates, were ultimately purchased for 1,900 marks and transported to Munich in a separate railway carriage. It is not possible to reconstruct the criteria used for the selection or how many pieces were left behind; in any case, the curator commissioned was not a qualified physicist or even a natural scientist. The acquisition took place under Jakob Heinrich von Hefner-Alteneck, the far-sighted second director of the museum. This institution was founded in 1855 as a museum on the history of Bavaria, its ruling dynasty and on decorative arts and sculpture. Hefner-Alteneck established, among other things, the so-called specialist collections during those years and sorted objects more strictly according to their genres. Scientific instruments obviously had a permanent place among them, but it should also be added that the Deutsches Museum (officially 'Deutsches Museum von Meisterwerken der Naturwissenschaft und Technik' / German Museum of Masterpieces of Science and Technology) in Munich was still a long way from being founded and could not serve as a receptacle for the Würzburg pieces.

In 1877, the collection was recorded in the accession book of the Bayerisches Nationalmuseum with a total of 173 items, although many of these numbers included several objects, meaning that a total of approximately 250 individual pieces were acquired. The redesign of the galleries around 1880 provided an opportunity to present most of the newly acquired objects from the Würzburg cabinet. The physical instruments now formed a separate section of the so-called specialist collections, but were only mentioned briefly in the museum guide. This changed only slightly in the new museum building, which opened in 1900. On 27 June 1933, numerous objects were handed over to the Deutsches Museum, but apparently not integrated into its inven-

tory and therefore returned to the Bayerisches Nationalmuseum on 28 May 1969, where they disappeared into the depots. Due to a lack of previous publications, the collection remained hidden from the attention of experts. The holdings of the Physics Cabinet were only represented by the most remarkable, but also the least characteristic piece in this collection, a huge planetarium with the height of 238 cm by Johann Georg Neßtfell, which has been on display in the permanent exhibition since 1999, testifying to the orientation of the prince-bishops of Würzburg towards the Enlightenment. Around 200 other objects have survived the passage of time since their acquisition by the museum, 45 of which have been selected for this exhibition.

Background in the 18th Century

The objects on display date mainly from the second half of the 18th century, although physics has been taught in Würzburg since the university was founded in 1582 and a physics cabinet has existed at least since the late 17th century. Physics taught at the University of Würzburg kept pace with scientific developments elsewhere. The chairs in physics were held by the Jesuits until the order was abolished in 1773. The prince-bishops as heads of state were above the teaching level. As members of the widely ramified and networked high nobility, they also proved to be a driving force in science, repeatedly initiating reforms and expanding the teaching of physics. A significant step was taken under Friedrich Karl von Schönborn-Buchheim, who presented new statutes for the university in 1731 and 1734, strengthening experimental physics, including astronomy, and placing an emphasis on practical mathematics such as geodesy. In 1749, Prince-Bishop Karl Philipp von Greiffenclau renewed the university's statutes, established a professorship for experimental physics and increased funding for the purchase of books and scientific instruments. In 1757, Prince-Bishop Adam Friedrich von Seinsheim founded an observatory, which was set up in the tower of the Neubaukirche at the university. Under his successor, Franz Ludwig von Erthal, the university continued to flourish without the need for further reforms, and in 1782 celebrated the 200th anniversary of its (second) founding with a large-scale jubilee celebration.

The Jesuit Blasius Henner (1713–1759), previously a professor of mathematics, took up the new chair in experimental physics in 1749 and was sent to Mainz, Nuremberg, Ingolstadt, Vienna, Prague, Dresden, Leipzig and Halle, as well as to France and the Netherlands, and thus expressly to 'non-Catholic' places, in order to familiarise himself with



Fig. 1 Barometer-thermometer from the Würzburg Residence. In the centre the barometer; to the left the thermometer with the Réaumur scale and to the right the thermometer with the Fahrenheit scale. © Copyright: Munich, Bayerisches Nationalmuseum. Foto: Bastian Krack.

the teaching of experimental physics and the collections of scientific instruments there. Ambros Egell (1732–1801), professor of experimental physics from 1771 to 1797, then had a major influence on the Physics Cabinet. He expanded the collection from one to two rooms, the second of which was now entirely dedicated to electricity. Like other collections of physical instruments at royal courts, at various universities and at monasteries, the Würzburg collection flourished in the second half of the 18th century. Some of the objects collected in Würzburg originate from instrument makers who were active beyond the region, but the works produced locally prove that the scholars there did not merely receive inspiration from outside, but were actively involved in development. The cabinet is also an example among the physical collections of Jesuit universities, which are in varying states of preservation and have been researched only very disparately to date.



Fig. 2 Wall clock with the (damaged) clock face at the top and two vertical bands of numerals below. © Copyright: Munich, Bayerisches Nationalmuseum. Foto: Bastian Krack.

Barometer-thermometer and Wall Clock

Two of the objects acquired by the Bayerisches Nationalmuseum as part of the Würzburg cabinet stand out from the other scientific instruments due to their rich carvings and the complexity of their manufacture.² They were most probably part of the furnishings of the Würzburg Residence, the magnificent palace of the prince-bishops of Würzburg, until they were incorporated into the Physics Cabinet probably in the early 19th century. The pieces were apparently designed as a pair, with a dial at the top, a vertical section in the middle and a transverse oval medallion with a dedication at the bottom. The first piece has a barometer in the middle, flanked on both sides by thermometers (Fig. 1). According to the inscription, the unit used for the scale next to the glass tube of the barometer is a 'Pede Parisino', i.e. a Parisian foot (32.48 cm/12.8 in), with the digits representing the inches derived from it. The critical range for air pressure fluctuations between 27 and 29 inches is located in the upper field with curved edges, where the French inscriptions for the various weather conditions can still be seen in rudimentary form. This display was supplemented by a lost dial above it, again for



Fig. 3 View of the exhibition with an Archimedean screw, a pile-driver and a crane in the foreground. © Copyright: Munich, Bayerisches Nationalmuseum. Foto: Bastian Krack.



Fig. 4 Functional model of the human eye, opened in this picture. Clearly visible are the lens and the blue iris around the pinhole in the front section on the right, and the frosted glass pane standing in for the retina on the left. © Copyright: Munich, Bayerisches Nationalmuseum. Foto: Bastian Krack.

air pressure, where the mechanism has been preserved with a simple gear conversion. The thermometer on the left measures the temperature in the Réaumur scale. It also records temperature peaks at various locations such as Paris, Venice, Berlin, Saint Petersburg, Tübingen, Göttingen, Tornio in Finland and, of course, Würzburg between 1709 and 1776, as is also found on French thermometers from the 18th century. The thermometer with the Fahrenheit scale on the right shows numerous marks of phase transitions of various substances.

The clock follows the basic form of the barometer's frame, although, ironically, its carving is superior and its gilding is further embellished with red and green lustre (Fig. 2). To

make use of the long vertical section, a second dial was introduced, counting the hours from VI to XII and then from I to VI. The entire clockwork mechanism and the hand for the jumping hour have vanished, leaving no clues as to their precise function. According to the ornamental style, the gilded frames were carved around 1735/40, while the oval panel bearing a dedication to Prince-Bishop Franz Ludwig von Erthal at the bottom of the clock dates to 1779. At the same time, at least the Réaumur scale must also have been reworked. Georg Henner, who succeeded his brother Blasius as professor of experimental physics, left his signature in the dedication. He is also documented as a painter and gilder on a few other objects. As the Rococo style



Fig. 5 Electrostatic toy with two gilded birds on the top of glass columns. © Copyright: Munich, Bayerisches Nationalmuseum. Foto: Bastian Krack.



Fig. 6 The pyrometer by Louis-Charles Gallond from Paris, following designs by Jean-Antoine Nollet. This comprises rods of brass, copper and two alloys of iron. These should be clamped over the elongated burning bowl. The expansion can be measured on a dial under the glass cover. © Copyright: Munich, Bayerisches Nationalmuseum. Foto: Bastian Krack.

of the frame would have been totally outdated in Würzburg by 1779, the barometer-cum-thermometer is probably the oldest surviving piece of its kind made in Germany.

Scientific Instruments for Teaching Physics

While these flashy objects may attract art lovers and bear witness to the prince-bishop's interest in meteorology, most of the exhibition is dedicated to the array of pieces used to teach physics at the university.³ These come from the fields of mechanics, pneumatics, hydraulics, geodesy, optics, gnomonics, magnetism, electricity and meteorology. Among the exhibits are several items that are well known from other 18th-century collections and have been widely published in books on teaching physics. Examples include an air pump, a *laterna magica*, a camera obscura, microscopes, pulleys, an Archimedean screw, a crane model and a pile driver (Fig. 3).

Alongside these, a few pieces are much rarer and most likely also testify to the manufacture of scientific instruments in Würzburg itself. One such piece is a simple periscope in the form of an elongated wooden box containing two speculum metal mirrors. It is mounted close to the glass of a showcase so that visitors can peer through the eyepiece and see a symbol seemingly at eye level, which is actually about 15 inches higher up on the opposite pane. In the same showcase is a model of the eye that demonstrates how vision works in a similar way to a camera obscura

(Fig. 4). Unlike many other surviving 18th-century models of the human eye, which aim for anatomical correctness, this is a functional model that enables the user to look through the lens and see the image in front of the eye upside down and reversed.

In the field of electricity, an electrostatic generator and a thunder house have disappeared, but an unusual 'electrostatic toy' (catalogued as 'elektrostatisches Spielzeug') has survived (Fig. 5). Two glass columns coated with hydrophobic sealing wax rise from a wooden pedestal. Two gilt wooden birds sit on top of the columns with rings in their beaks. X-ray images reveal that iron wires run through each of the glass columns into the back of the birds. The exact function of this toy, which does not appear in any other collection, remains unknown, but it is likely that it led to a discharge in some way.

This piece was most likely made in Würzburg, as is documented for a few other scientific instruments. Among the considerable number of sundials from the cabinet, two were designed by Michael Anton Schwab, who subsequently became professor of metaphysics, of theoretical physics and of mathematics. Of these altitude-based sundials one was created in 1794 and the other in 1802. His colleague, Ambros Egell, who was professor of experimental physics from 1771 to 1797, made two thermometers with Réaumur scales. Within the group of imported objects, the finest is probably a pyrometer (or dilatometer) signed by

Louis-Charles Gallond from Paris. It catches the eye with its exquisite veneered pedestal and ornamented brass fittings (Fig. 6).

In addition to the aforementioned periscope, several types of anamorphosis allow visitors to interact with the exhibits to a limited extent. In order to make the exhibition more accessible to a wider audience, cooperation with a local school was sought. It turned out that the teacher of physics at a grammar school in the immediate neighbourhood of the museum had found a group of interested and committed students. They produced a series of playful videos interpreting historic scientific instruments, discussing their use, and partly reconstructing them with modern materials. These videos are shown in the exhibition.

Outlook

As with so many other historic collections, no interior views of the cabinet survive and none were probably produced. In order to stimulate the impression of such a collection, two historic depictions are shown in the entrance area of the exhibition: the better-known 'Cabinet géométrique de M. Le Clerc' by Sébastien Le Clerc from the early 18th century,⁴ and the rarely published interior of the 'Armarium physico-mathematicum' in the monastery of Indersdorf, around 25 miles outside Munich, dating from 1762 (Fig. 7).⁵ The latter is an accurate portrayal, even including the Baroque frescoed ceiling. The ambitious abbot Gelasius Morhart of the Augustinian canons' convent published a lavish book on his mon-

astery, which also featured a state-of-the-art physics cabinet. Comparisons between these prints reveal striking similarities, including the order of the instruments on the shelves and the presence of books, as well as recurring pieces such as Archimedean screws, crane models, pulleys, and anamorphoses. However, only the latter cabinet also features an air pump (vacuum pump) or an electrostatic generator. Should further depictions of this kind be unearthed, it would pave the way for more in-depth research into the arrangement of these cabinets.

During the course of the research, it emerged that the Würzburg Jesuits, as well as those in other places, produced a number of educational books following in the footsteps of John Theophilus Desaguliers and Jean-Antoine Nollet. In Würzburg, Blasius Henner was to publish his 'Conatus Physico-Experimentales' in two volumes, the first in 1756, while the latter was edited posthumously by his brother Georg Henner in 1760.⁶ These volumes were digitised in recent years and are available online, but they seem to have received little attention since then. This may be because they are written in Latin, and the teaching of physics changed considerably from the early 19th century onwards. These volumes still provide an endless source of research, to which the works of Berthold Hauser, a Jesuit from Dillingen on the river Danube,⁷ of Joseph Mangold in Ingolstadt⁸ and several other scholars can be added. The plates in these books partly read like a catalogue of the collections. A detailed evaluation of them would be very rewarding, both for cataloguing the remaining pieces in these cabinets and for understanding the lost items and reconstructing the individual features of these collections, as well as the research paths taken by the scholars.

Keywords: Karl Philipp von Greiffenclau, Jesuits and science, experimental philosophy, electrostatic toys, historical science collections, barometer, thermometer.



Fig. 7. The *Armarium physico-mathematicum* in the monastery of Indersdorf, seen in a print from 1762, as an example of a physics cabinet in a similar Roman-Catholic environment as in Würzburg. On the left several anamorphoses are shown on low pedestals, on the right an electrostatic generator in the foreground and an air pump behind.

Notes and References

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2. Raphael Beuing, 'Wetterstation für den Fürstbischof: Eine Barometer-Thermometer und eine Wanduhr aus der Würzburger Residenz', in Kammel (op. cit.), pp. 106-120.
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5. The print can be found in Gelasius Morhart, *Kurtze Historische Nachricht von Dem Ursprung und Fortgang Deß Stifft- und Closters Undersdorff*, ... (Augsburg, 1762), <https://www.digitale-sammlungen.de/de/view/bsb11083253?page=27> [August 8th, 2025]. An inventory of the collection was drawn up with the dissolution of the monastery in 1783: *Urkunden über die Klosteraufhebung zu Intersdorf in Bayern* (Munich, 1783 and 1784), pp. 25-31, <https://www.digitale-sammlungen.de/de/view/bsb11250381?page=27> [August 8th, 2025]. All this was combined by Peter Dörner, 'Die physikalische Sammlung des Klosters Indersdorf', *Amperland*, 14 (1978), pp. 296-299, 318-321.
6. Blasius Henner, *Conatus Physico-Experimentales de corporum affectionibus tum generalibus tum specialibus* ..., 2 vols. (Würzburg, 1756 and 1760).
7. Berthold Hauser, *Elementa philosophiae ad rationis et experientiae ductum conscripta* ..., 8 vols. (Augsburg/Innsbruck, 1755-1764).
8. Joseph Mangold, *Philosophia Rationalis Et Experimentalis* ..., 3 vols (Ingolstadt/Munich, 1755 and 1756).

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THE DIVIDED CIRCLE, a brass compass-maker's plate, English, by W. Eyre:

- Angular Template and Compass Rose 1680
- Printing Plate engraved in reverse, 1681

