**Figure 15.1:** *Staircase of Vienna Observatory (Institut für Astronomie der Universität Wien)*

# 15. The University Observatory Vienna

*Anneliese Schnell (Vienna, Austria)*

## 15.1 Introduction

In spring of 2008 the new Vienna Observatory was commemorating its 125$^{th}$ anniversary, it was officially opened by Emperor Franz Joseph in 1883. Regular observations had started in 1880. Viennese astronomers had planned that observatory for a long time. Already Karl von Littrow's father had plans early in the 19$^{th}$ century (at that time according to a letter from Joseph Johann Littrow to Gauß from December 1, 1823 the observatory of Turku was taken as model) (Reich 2008), but it lasted until 1867 when it was decided to build a new main building of the university of Vienna and also a new observatory. Viennese astronomers at that time had an excellent training in mathematics, they mostly worked on positional astronomy and celestial mechanics. They believed in F. W. Bessel's idea that the only task of astronomy is to find rules for the motion of any celestial object which allow the determination of its position for any time. They wanted to have an observatory outside of the centre of Vienna with the best and largest instruments available.

## 15.2 Karl Littrow and his "Theatre for Stars"

Karl Littrow (1811–1877) did even send Edmund Weiss (1837–1917) to the United States and England to inspect new observatories and firms which built telescopes. Weiss reported about that journey in 1873 in the *Vierteljahrsschrift der Astronomischen Gesellschaft.*

He visited Dudley Observatory, Hamilton College, Ann Arbor, Chicago University, Washington University, Cincinnati, the US Naval Observatory and Harvard College. Especially he describes meridian circles because a new meridian circle was one of the wishes of the Viennese astronomers (which never was fulfilled). I think that it is remarkable that even at Harvard Observatory where at that time already photographic techniques have been used and some spectroscopy has been done most of his attention had been attracted by the meridian circle. The institutions he visited in England he did not describe in such an extensive way because in his opinion they were well known from the literature. At the end of this publication Weiss puts a lot of emphasis on the description of reasons why one should prefer non-German instrument makers (E. Weiss 1873).

During a couple of years Vienna Observatory was editing an astronomical calendar. In the 1874 edition K. L. Littrow wrote a contribution about the new observatory in which he defined the instrumental needs:
*"für Topographie des Himmels ein mächtiges parallaktisches Fernrohr, ein dioptrisches Instrument von 25 Zoll Öffnung. Da sich aber ein Werkzeug von solcher Größe für laufende Beobachtungen (Ortsbestimmung neuer Planeten und Kometen, fortgesetzte Doppelsternmessungen, etc.) nicht eignet, ein zweites, kleineres, daher leichter zu handhabendes, aber zur Beobachtung lichtschwacher Objekte immer noch hinreichendes Teleskop von etwa 10 Zoll Öffnung, und ein Meridiankreis ersten Ranges von beiläufig 8 Zoll Öffnung für eigentliche Fundamentalmessungen. Dieser Hauptpark der künftigen Sternwarte sollte durch die bereits vorhandenen, vielfach noch sehr brauchbaren Hilfsmittel ergänzt werden."* (Littrow 1874).

This clearly shows the intention to do just the same work as before but with larger and better instruments. With this description and choice of instruments it was decided on astronomical work for the following decades.

As architects Ferdinand Fellner (1847–1916) and Hermann Helmer (1849–1919) were choosen, they became famous in the Austro-Hungarian Monarchy mainly for their theatre buildings. Nowadays there are 48 theatres which have been designed by them, examples are the *Deutsches Schauspielhaus* in Hamburg or the *Komische Oper* in Berlin. A complete list of all their buildings can be found in the *Architektenlexikon* compiled by the *Architekturzentrum Wien.* Probably for this reason Littrow spoke about a theatre for stars in which he would reside like a prince of science. When they started planning the observatory their cooperation had just begun (1873), and they fulfilled all of Littrow's wishes. They followed the example of Schinkel's observatory for Encke in Berlin with its shape of a cross. As building site a hilly area, the so called Türkenschanze, in the outskirts of the city of Vienna in northwestern direction had been choosen.

An area of about 55,000 square meters had been bought in 1872, now this area is protected by law, it should be preserved in its initial natural state. Since

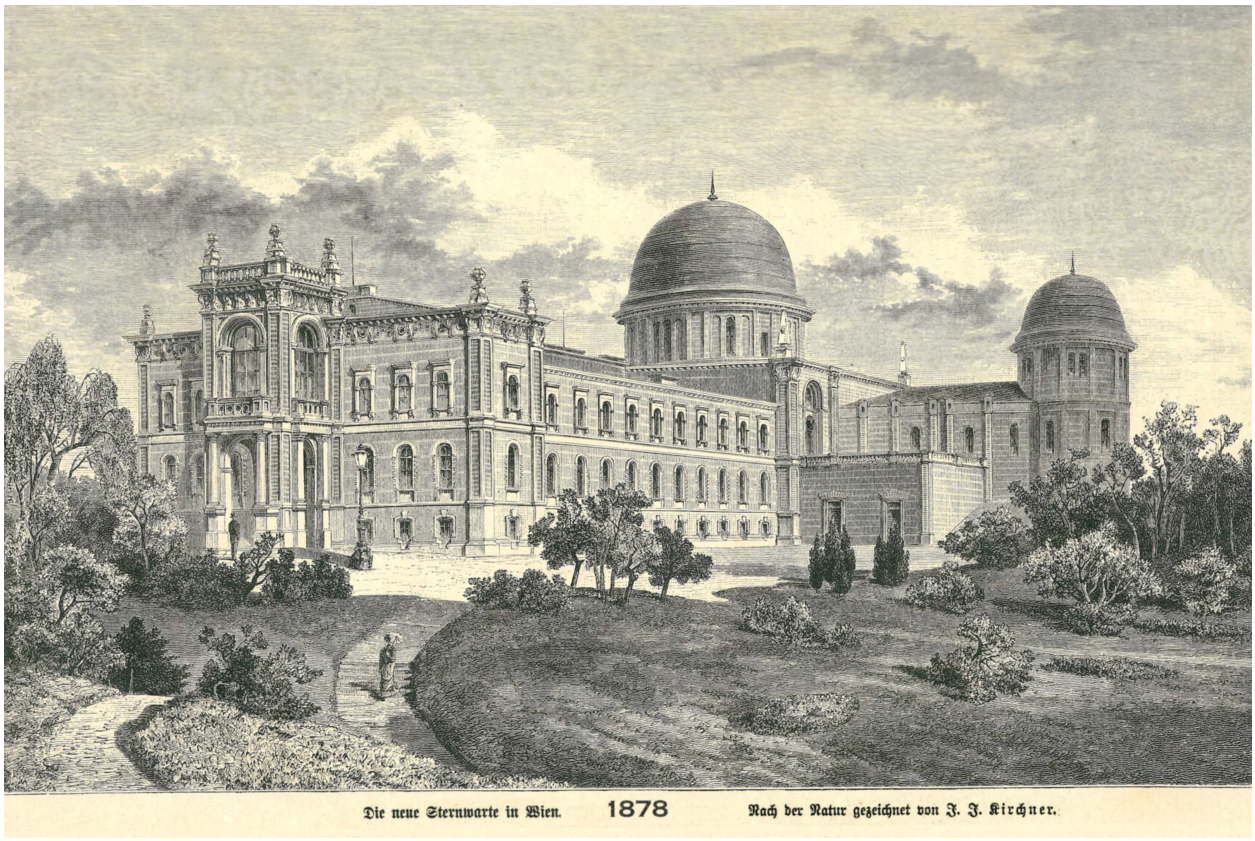


**Figure 15.2:** *Vienna Observatory (contemporary drawing by J. J. Kirchner, 1878)*

most parts never have been cultivated the observatory grounds now represent a real heritage in which for example some kinds of animals survived amidst town.

The cross-shaped building (Fig. 15.2 and 15.3) was and still is the world's largest observatory building, at the time of its erection combining both, the observatory and living quarters for the astronomers. The southern part of the long axis of the cross, north – south orientated (and thus turned for 90 degrees in respect to the old Berlin observatory) contained the library and the living quarters (first floor for the director, at the ground level for the astronomers and in the souterrain for servants). The staircase resembles to the entrance hall of a theatre and has a glass roof conveying the impression of being in a courtyard. It is surrounded by columns and by arcades on the first floor. Something special is the floor of a kind of stony mosaic.

Relief busts of Edmund Weiss (after his retirement 1908) and of Johann Palisa have been added next to the entrance of the building, in the staircase (Fig. 15.1) is a monument of Emperor Franz Joseph which was erected 1908 to commemorate 60 years of his emperorship, it was made by Edmund Hoffmann von Aspernburg (1847–1930).

## 15.3 Instruments of Vienna Observatory

In the centre of the building is the revolving dome for the largest instrument, the room leading to the meridian rooms was called "cirkulärer Saal". It is a huge representative room with fake marble at its walls. Painted lines on the ceiling pretend the existence of vaults. At the northern end of the cross is another revolving dome and two more are at the eastern and western ends of the second axis which also contained two meridian rooms. Soon astronomers found out that it was not a good idea to have the living quarters south of the main instrument. Vienna observatory was the last European observatory consisting of only one building, all other observatories which have been built later house only one telescope per building. A more detailed description is given by Peter Müller (1975).

Such a generous planning nowadays not always allows to solve space-problems, but it helps a lot. It was easy to turn the living quarters and one of the meridian rooms into offices, into the eastern meridian room the library was transferred, this happened 1967. It was done for the sake of innovation, the director of the observatory and the astronomers were not thinking on preservation of historic parts of the furniture. For this reason the library lost its original handmade furniture. In the western meridian room there are offices as well, lecture rooms have been added. In the souterrain later on a mechanical workshop has been installed. Originally there existed one workshop at the "Polytechnikum", nowadays the Technical University. This workshop was used by all Viennese institutions doing astronomical or geodetic research, as byproduct the firm Starke & Kammerer resulted.

**Figure 15.3:** *Vienna Observatory, photograph taken from the southern part of the roof of the building (Institut für Astronomie der Universität Wien)*

The main instrument, a 27-inch refractor (Fig. 15.4), and the revolving domes were ordered from Grubb of Dublin, a 12-inch refractor was built by Alvan Clark of Boston, the meridian circle made by Reichenbach was transferred from the old observatory. The 27-inch refractor at the time of its installation was the largest telescope of the world. Later on two more instruments were added in extra buildings; an Equatoreal Coudé with an aperture of 38 cm in 1890 through a donation by Albert von Rothschild and a so called "Photographic Pavillon" with a normal astrograph in 1907. At least the building for the Coudé telescope was also designed by Fellner and Helmer. The style of all buildings is the same: bricks. On the main building there are ornamental decorations made of sandstone above the windows of the first floor.

The optics of the Equatoreal Coudé came from the workshop of the brothers Henry, the mechanics was built by Gautier in Paris, it was the second largest instrument of that type ever built with an aperture of 380 mm and a focal length of 25 m, and the only one in a not French speaking country. A probable reason that Vienna observatory had such an instrument might be that the inventor of that kind of telescope, Maurice Lœwy (1833–1907), was born in Vienna, studied at the Polytechnikum and the University of Vienna and got his astronomical training at the old Vienna observatory. He emigrated to France because in Austria of that time as a jew he could not get a position at the university. In 1896 he became director of the observatory of Paris.

Nearly all of the instruments (Fig. 15.5) of the old observatory have been transferred to the new one, nowadays they are kept in a small museum which is located in the most representative room of the original apartment of the director. Vienna observatory also has a collection of rare books, catalogues have been published (Kerschbaum/Posch 2005; Lackner/Müller/Kerschbaum/Ottensamer/ Posch 2006).

## 15.4 Vienna Astronomers and their Activities

Littrow died in 1877, his successor became Edmund Weiss. Weiss with one exception did not publish annual reports in the *Vierteljahrsschrift der Astronomischen Gesellschaft*, probably because he was aware that at the same time at the private Kuffner Observatory much more time adequate and modern work was done, another reason could be that he did not like to do this kind of work. But from their publications we know that astronomers did positional astronomy and orbit determination of asteroids and comets. A detailed description had been given by Maria G. Firneis (1985).

The best known Viennese astronomer of that time was Johann Palisa (1848–1925) who gave up his position as director of the Naval Observatory of Pola for the possibility of working with the world's largest telescope. Palisa was specialized on visual discovery of Minor Planets, in total he has found 121 objects. Palisa did not only discover new objects, much time he spent in observing objects which have been found by other colleagues to measure their positions to enable orbit determination. In cooperation with Max Wolf (1863–1932) from Heidelberg the Wolf-Palisa-Charts were produced, an early

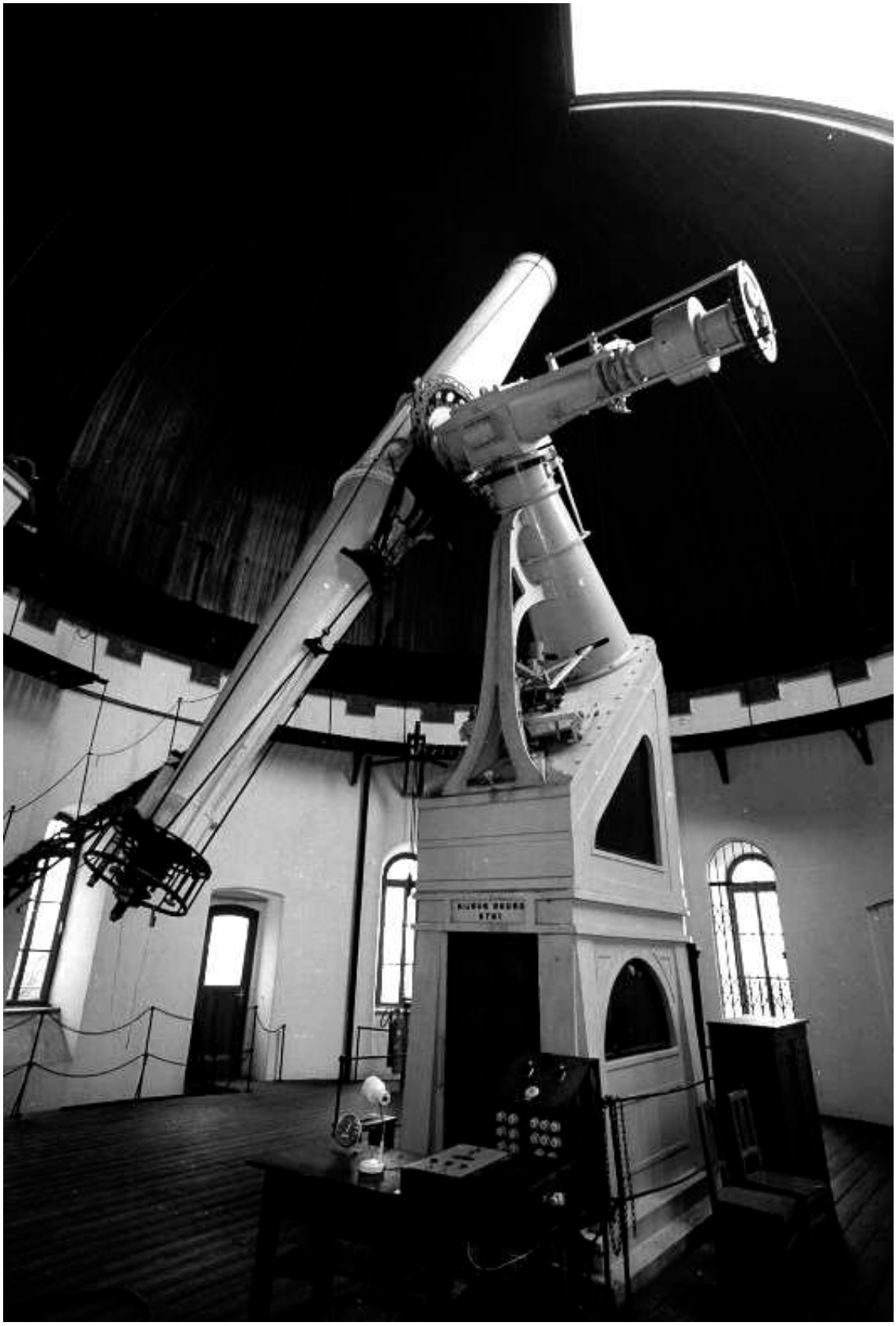

**Figure 15.4:** *The main telescope, a 27-inch refractor, Grubb of Dublin (1878) (Institut für Astronomie der Universität Wien)*

**Figure 15.5:** *Instruments in the museum in Vienna Observatory (Institut für Astronomie der Universität Wien)*

photographic stellar atlas along the northern part of the ecliptic. Due to World War 1 the production had been stopped. Palisa also published a so called "Sternlexikon" containing the exact positions of all reference stars he had used, partly in cooperation with his son in law Friedrich Bidschof (1864–1915). Bidschof was the first observer at the Equatoreal Coudé determining visually positions of stars and comets before he became director at the Naval Observatory of Trieste.

Johann Palisa was aware of the need of information for the public about astronomy as well. He was the first astronomer who gave popular talks at various societies, at the occasion of the reappearance of Halley's Comet he even spoke in the largest concert hall of Vienna, the *Musikvereinssaal*. His sons in law Bidschof and Josef Rheden (1873–1946) followed this example. This kind of popularizing and keeping public relations has been pioneering.

Other astronomers in Vienna working at that time were Johann Holetschek (1846–1923) who was the first astronomer at Vienna observatory who had not only studied astronomy and mathematics but also physics. He worked both as observer and as theoretician, mostly dealing with comets, their orbits and developed a method to determine their integral brightness – the first try of astrophysical work at Vienna observatory. With the old 6-inch Fraunhofer refractor which already existed at the old observatory he observed nebulae – most of them were as we know today galaxies – and determined their brightness as well. The catalogue of these objects was rereduced by Kasimir Graff in 1948.

Rudolf Spitaler (1859–1946) tried to establish photography at the 27-inch refractor. The difficulty he had to deal with was that the optics of the telescope was corrected for visual wavelength, the photographic plates used at that time were most sensitive in the blue spectral range. But his experience in later years helped with using this telescope for photography.

During the years before 1900 Vienna as capital of the Austro-Hungarian Monarchy grew enormously. While the number of inhabitants in 1870 was about 840,000, there were living about 2 millions of people in 1900 in Vienna. It is quite clear that the new observatory was amidst town and the observing conditions deteriorated, especially light pollution was high. Already in 1900 and in 1902 at the meetings of the *Astronomische Gesellschaft* in Heidelberg and Göttingen Karl Kostersitz spoke about a project of an astrophysical and meteorological observatory on top of the Schneeberg (2076 m high), the easternmost mountain of the Alps, or of the Sonnwendstein (1523 m high). The new observatory (Fig. 15.6) should be the main institution of the Monarchy and an exact copy of Vienna Observatory. Viennese astronomers, especially Palisa, supported that project, even meterological investigations started and had been carried out during a long time (K. Kostersitz 1900, 1902). This project was never realized, but in 1969 Vienna Observatory got a 1.5 meter telescope in the Vienna Woods.

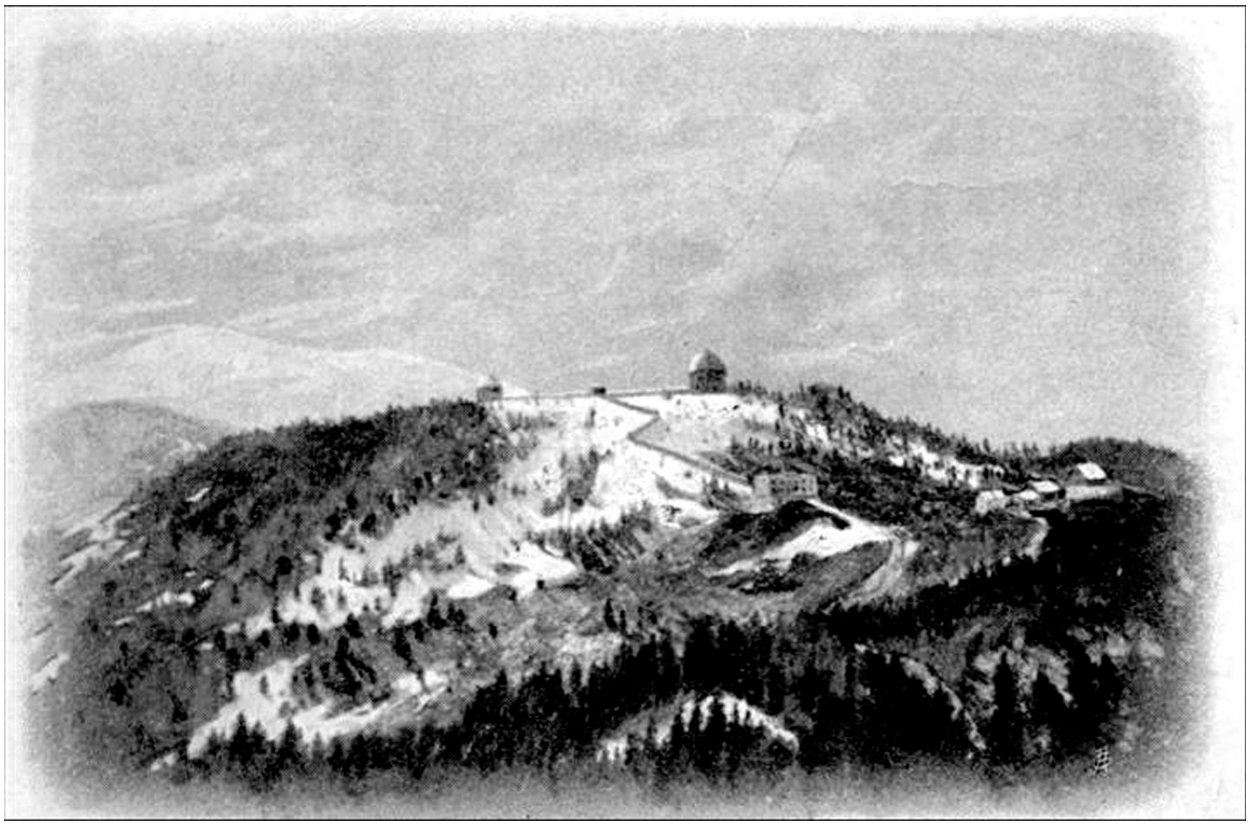

**Figure 15.6:** *Early drawing of a mountain observatory (Institut für Astronomie der Universität Wien)*

After the death of Edmund Weiss Josef Hepperger in 1909 became director of the observatory. Among observing astronomers which denied an offer to come to Vienna were Hugo von Seeliger and Max Wolf (Archive of University of Vienna). Hepperger was professor at Vienna University since 1901. He was a theoretician as well, but he had studied physics and he knew about the importance of astrophysics. Under his directorship Adolf Hnatek (1876–1960) who originally worked at the technical branch of the postal administration got a position at the observatory even before he had finished his studies of astronomy. Before he worked at the observatory Hnatek determined cometary orbits. With the astrograph he used Schwarzschild's method of extrafocal stellar images on photographic plates to do photographic photometry (A. Hnatek, 1911). For the Equatoreal Coudé a spectrograph from Askania has been bought and attached to the telescope.[1] Hnatek determined radial velocities of stars. It lasted until 1928 when Kasimir Graff became professor at the University of Vienna and director of the Vienna Observatory that Vienna Observatory had its first director who was not a theoretical astronomer but an observer.

## 15.5 The Kuffner Observatory in Vienna

Nearly at the same time between 1884 and 1887 a private observatory was financed by the beer brewer Moriz von Kuffner (1854–1939).[2] Directors there were Norbert Herz (1858–1927) and Leo de Ball (1853–1916). Other astronomers only were employed for a few years.

One of them was Samuel Oppenheim (1857–1928), who worked at the Kuffner Observatory between 1888 and 1896. He realized the importance of photography for astronomy and could convince Kuffner to add a photographic tube to the refractor. In 1894 he published a paper about GC 1166, in which as a byproduct he tried to determine the brightness of stars by their diameter on the photographic plate, he failed because he did cot take into account that such a method only works for stars of the same spectral type.

From 1897 to 1899 Karl Schwarzschild (1873–1916) worked at the Kuffner Observatory. He examined different photographic emulsions and developed a technique to determine stellar brightness by means of extrafocal records. Using plates taken from the Pleiades, Praesepe and h and $\chi$ Persei he found what what we now know as the Schwarzschild exponent. By his work he was able to show that photographic photometry was significantly superior to visual magnitude estimates. It demonstrates that astrophysical research and technology was earlier carried out at Kuffner Observatory than at the University Observatory. The former one could be proud to have hosted the young Karl Schwarzschhild, one of the world's most famous astronomers.

## 15.6 Heritage at Risk?

Today all buildings of the University Observatory are listed as historic monuments. In reality this is not helpful at all because of the lack of money, at least for the buildings of the aequatoreal coudé and of the astrograph. A gatekeepers lodge and one of the oldest houses of Währing have already been pulled down several years ago.


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1. Schnell 2008.
2. Habison 2008.

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