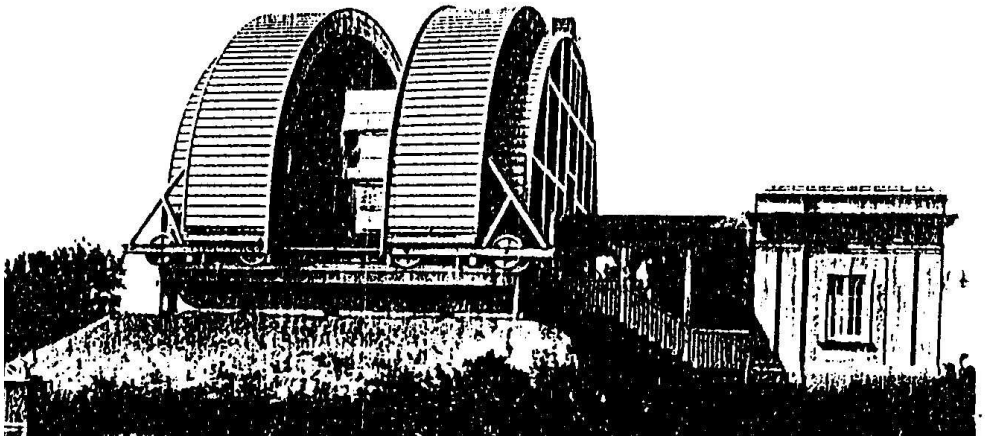
Gudrun Wolfschmidt (ed.)

ICOMOS – International Symposium

Cultural Heritage Astronomical Observatories (around 1900) – *From Classical Astronomy to Modern Astrophysics*

Hamburg-Bergedorf,
14. to 17. October 2008

Booklet of Abstracts



Hamburg: Institute for History of Science 2008

Web Page of the Symposium:
http://www.math.uni-hamburg.de/spag/ign/events/icomos08.htm

Cover illustration:
Hamburg Observatory, 1906–1912, 1-m-reflector

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- **Prof. Dr. Monika Auweter-Kurtz,**
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- **Prof. Dr. Gudrun Wolfschmidt,**
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- **Förderverein Hamburger Sternwarte e. V. (FHS)**
- **Prof. Dr. Jürgen Schmitt,**
  Hamburger Sternwarte, Universität Hamburg

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Universität Hamburg

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- **Behörde für Kultur, Sport und Medien**
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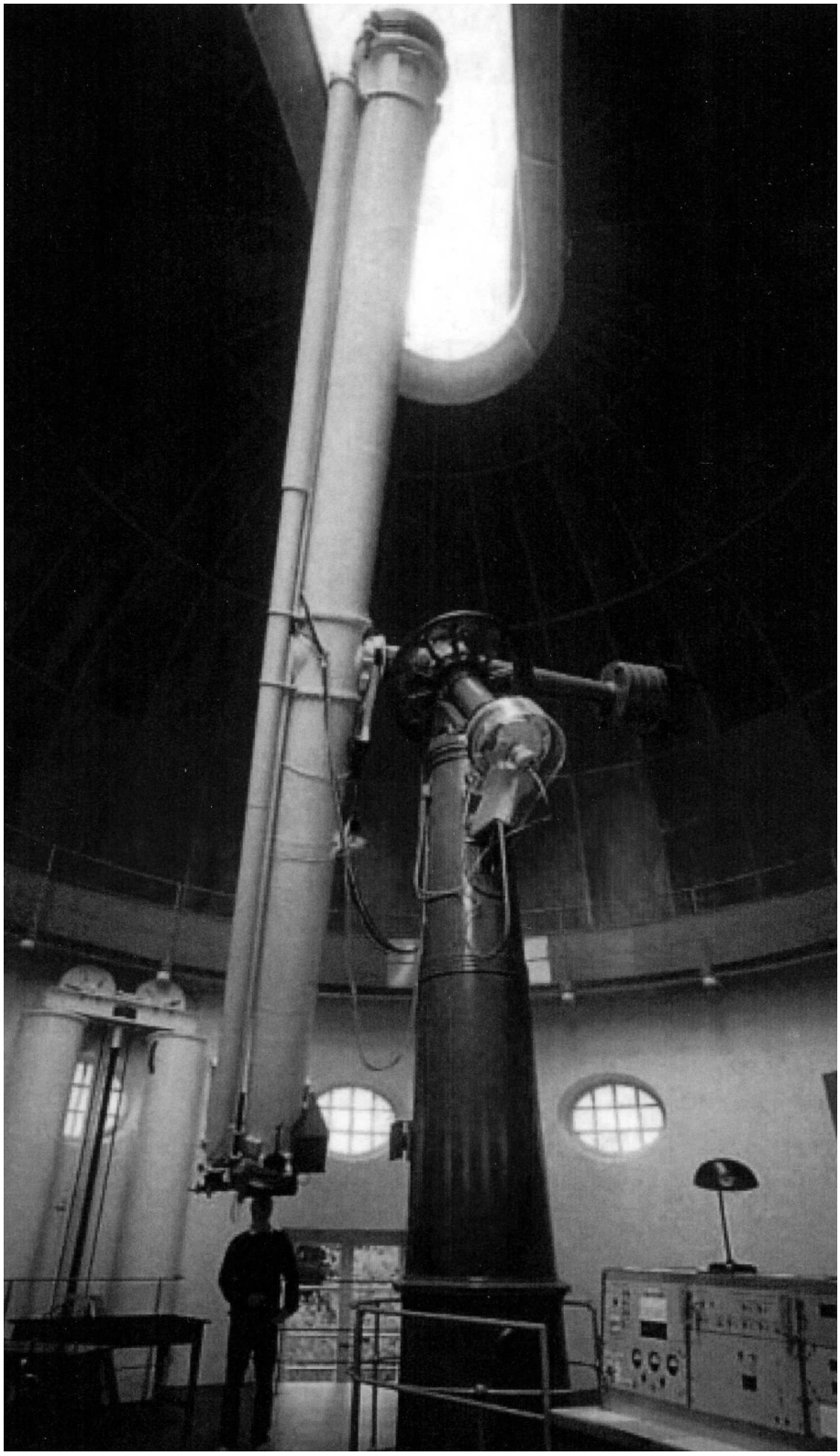

Figure 0.1:
Large refractor (60 cm, 9 m), Mechanics: A. Repsold & Söhne, Hamburg, 1911
Optics: Steinheil, München (visual objective, 1914, photographic objective, 1925)

Hamburg Observatory

Programme – ICOMOS – Cultural Heritage – Astronomical Observatories

Tuesday, 14. October 2008 – Evening 19 h

Rathaus Bergedorf (Spiegelsaal) – Get together party

19.00	Grußworte (Welcome address) Bezirksamtsleiter Dr. Christoph Krupp Grußworte (Welcome address) Staatsrat Bernd Reinert Grußworte (Welcome address) Prof. Dr. Gudrun Wolfschmidt

Ratskeller

(only for contributors)

Wednesday, 15. October 2008
Haus im Park in Bergedorf

1. Opening of the symposium – Eröffnung des Symposiums

10.00	Eröffnung des Symposiums Grußworte (Welcome address) Senatorin Dr. Herlind Gundelach, Präses der Behörde für Wissenschaft und Forschung Grußworte (Welcome address) Frank Pieter Hesse Leiter des Denkmalschutzamtes Hamburg Anna Sidorenko-Dulom, Paris, UNESCO World Heritage Centre ? Coordinator Thematic Initiative „Astronomy and World Heritage"' Introduction: Prof. Rajesh Kochhar (IAU, C 41), India *Astronomical Heritage: Towards a global perspective and action* Opening lecture: Prof. Dr. Michael Petzet, München, Präsident des Deutschen Nationalkomitees von ICOMOS
12.00– 14.00	Reception

2. From Classical Astronomy to Modern Astrophysics

Chairperson: Gloria Clifton, Greenwich, UK

14.00	Gudrun Wolfschmidt, Hamburg, Germany: *Cultural Heritage of Observatories and Instruments –* *From Classical Astronomy to Modern Astrophysics*
14.30	Viktor Abalakin, St. Petersburg, Russia: *The Pulkovo Observatory on the Centuries' Borderline*
15.00	Suzanne Débarbat (Paris, France) *At the Belle Epoque, astronomy and astrophysics* *at the Observatoire de Paris*
15.30	Pedro Chalbaud, Mérida, Venezuela: *The Truncated Modernization (1950–1959):* *Eduardo Röhl and the Observatories of Cagigal and Hamburg* *– A look from the outside*

3. Hamburg Observatory in Bergedorf

16.00	Grußwort (Welcome address): Prof. Dr. Jürgen Schmitt, Director of Hamburg Observatory
	Guided tour through the observatory (Förderverein Hamburger Sternwarte) (English: M. Hünsch, G. Wolfschmidt) (German: A. Seemann, H. Schlepegrell, W.-D. Kollmann) There are different options: Architecture, Instruments, Restauration:
	Agnes Seemann: *Architecture of Hamburg Observatory* Henry Schlepegrell: *Restauration activities of the observatory buildings – past and future*
18.00– 18.30	Peter Müller, Köln, Germany: *The Observatory of Hamburg-Bergedorf,* *compared with other Observatories about 1900*
	Guided tours through the observatory (German) Coffee break
19.30	Panel discussion *Observatories as Universal Heritage* *(Der Weg zum Weltkulturerbe?)* Prof. Dr. Michael Petzet, München, Präsident des Deutschen Nationalkomitees von ICOMOS Prof. Dr. Karin von Welck, Senatorin für Kultur, Sport und Medien Prof. Dr. Monika Auweter-Kurtz, Präsidentin der Universität Hamburg Annette Liebeskind, Deutsche Stiftung Denkmalschutz Moderation: Ulf-Peter Busse, Bergedorfer Zeitung
21.00	Reception in the observatory

Thursday, 16. October 2008
Haus im Park in Bergedorf

4. Astronomical Observatories around 1900

Chairperson: Suzanne Débarbat, Paris, France

9.00	Pedro Raposo, Oxford / Lisbon: *The material culture of nineteenth-century astrometry,* *its circulation and heritage at the Astronomical Observatory of Lisbon*
9.30	Christophe Benoist, Nice, France / Istanbul: *Two observatories in Istanbul:* *from the late Ottoman Empire to the young Turk Republic*
10.00	Marcus Granato, Rio de Janeiro, Brasilia: *Heritage and the observatories in Brazil around 1900, a brief review*
	Coffee Break

Chairperson: Ileana Chinnici, Palermo, Italy

11.00	James Caplan, Marseille, France: *The Marseille Observatory: the final move.* *A case study in the conservation of astronomical heritage.*
11.30	Anneliese Schnell, Vienna, Austria: *The University Observatory Vienna*
12.00	Lajos G. Balázs and Magda Vargha, Budapest, Hungary: *The first 50 years of Konkoly Observatory*
12.30– 14.00	Lunch Break

5. Cultural Heritage of Observatories

Chairperson: Viktor K. Abalakin, St. Petersburg, Russia

14.00	Magda Stavinschi and Catalin Mosoia, Bucharest, Romania: *Considering heritage as part of astronomy –* *100 years of Bucharest Observatory*
14.30	Gloria Clifton, Greenwich, UK *The Royal Observatory, Greenwich, London:* *presenting a small observatory site to the public*
15.00	Reet Mägi, Tartu, Estonia: *The Heritage of the 200-year-old University Observatory in Tartu*
	Coffee Break

Chairperson: James Caplan, Marseille, France

16.00	Juan Carlos Forte and Sofia A. Cora, La Plata, Argentina: *La Plata Observatory*
16.30	Françoise Le Guet Tully, Observatoire de la Côte d'Azur, Nice, France and Hamid Sadsaoud, Observatoire d'Alger, Algeria: *Astronomical heritage sites: two early "mountain" observatories* *on the Mediterranean coast*
17.00	Brian Mason, Washington, D.C., USA: *U. S. Naval Observatory*

6. "175 Years Hamburg Observatory"
City Hall (Rathaus) in Hamburg

19.00	Grußworte (Welcome address) Staatsrat Bernd Reinert, Behörde für Wissenschaft und Forschung Grußworte (Welcome address) Prof. Dr. Monika Auweter-Kurtz, Präsidentin der Universität Hamburg
	Lecture by Prof. Dr. Rudolf Kippenhahn (Göttingen): *Faszination Astronomie – Die letzten zwei Jahrhunderte*
	Short Lecture by Prof. Dr. Dieter Reimers (Hamburg) *Geschichte und Zukunft der Hamburger Sternwarte*

Senatsempfang im Rathaus Hamburg – (State Reception in the City Hall Hamburg)

Friday, 17. October 2008
Haus im Park in Bergedorf

7. Instruments, restoration and virtual heritage

Chairperson: Paolo Brenni

09.00	Jean Davoigneau, Strasbourg, France: *The architectural and instrumental heritage of the Strasbourg university observatory*
09.30	Ileana Chinnici, Palermo, Italy: *Italian Astronomical Observatories and their historical instruments collections*
10.00	Martin Šolc, Prague, Czech Republic: *Prague and Ondřejov Observatory*
	Coffee Break

Chairperson: Inga Elmqvist Söderlund, Stockholm, Sweden

10.30	Shylaja B. S. (Bangalore, India) *Advent of Astronomical Instruments and their impact – the Indian context*
11.00	Matthias Hünsch, Hamburg, Germany: *The telescopes of Hamburg Observatory – history and present situation*
11.30	Ruth Keller-Kempas, Berlin, Germany: *Possibilities and strategies for the conservation of technical objects like telescopes*
12.00	Beatrix Alscher, Berlin, Germany: *The 1m-Reflector – an object of technical heritage and a concept of its restoration / preservation*
12.30– 14.00	Lunch Break

Chairperson: Gudrun Wolfschmidt

14.00	Paolo Brenni, Florence, Italy *Non astronomical research* *in astronomical observatories*
14.30	Björn Kunzmann, Hamburg, Germany and Peter Kroll, Sternwarte Sonneberg: *Real and Virtual Heritage –* *Digitized Photographic Plate Archives in Astronomical Observatories*
15.00	Closing remarks: Frank Pieter Hesse, Denkmalschutzamt Hamburg
	End of the conference

Additional offer:

Gudrun Wolfschmidt:
Guided tour through Hamburg
to places of interest in respect to history of astronomy

Closing dinner.

Figure 0.2:
Building for the large refractor

Hamburg Observatory

Get together Party

Tuesday, 14. October 2008, 19 h

Rathaus Hamburg-Bergedorf (Spiegelsaal)

Wentdorfer Str. 38

- Grußworte (Welcome address)
  Bezirksamtsleiter Dr. Christoph Krupp
- Grußworte (Welcome address)
  Staatsrat Bernd Reinert
- Grußworte (Welcome address)
  Prof. Dr. Gudrun Wolfschmidt

20 h – Ratskeller Bergedorf

(only for contributors)

Figure 1.1:
Armillary sphere at the entrance of the Hamburg Observatory

Hamburg Observatory

1. Opening of the symposium – Eröffnung des Symposiums

Haus im Park in Bergedorf
Wednesday, 15. October 2008, 10 - 12 h

- Organisation/Moderation: Gudrun Wolfschmidt,
  Institute for History of Science

- Grußwort (Welcome address):
  Senatorin Dr. Herlind Gundelach,
  Präses der Behörde für Wissenschaft und Forschung
  (Senator for Science and Research)
- Grußwort (Welcome address):
  Frank Pieter Hesse,
  Leiter des Denkmalschutzamtes Hamburg

- Anna Sidorenko-Dulom, Paris, UNESCO World Heritage Centre ?
  Coordinator Thematic Initiative „Astronomy and World Heritage"'

- Rajesh Kochhar (Chandigarh, India):
  Introduction: *Astronomical Heritage:*
  Towards a global perspective and action

- Opening lecture: Prof. Dr. Michael Petzet, München,
  Präsident des Deutschen Nationalkomitees von ICOMOS

12.00–14.00 h – Reception

1.1 Astronomical Heritage: Towards a global perspective and action

Prof. Rajesh Kochhar (Chandigarh, India)

(Former Director NISTADS, New Delhi)
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This international symposium is taking place in the 400th year of the chance invention of telescope. The accidental discovery in 1608 of a combination of lenses by the Dutch optician Hans Lippershey may belong to the realm of romance of history. But the next year when Galileo made the world's first designer telescope and turned it skywards, he initiated a revolution the impact of which has gone beyond astronomy and science.

Homo Sapiens is an astronomical species. Ever since humans learnt to walk upright they have looked at the sky and wondered. The sky has remained the same but its meaning as well as significance has continually changed. To begin with, the sky was a divinity to be feared and appeased. It then became a phenomenon to be observed and utilized. And finally now it has been reduced to be an object of study and a laboratory for testing our scientific theories. In the course of time as the human intellect gradually gained sophistication, humankind also reworked its equation with nature. From estimating angles to measuring distances our understanding of the skies has indeed deepened, literally and figuratively.

Astronomy today is at the cutting edge of intellectual enquiry and, at its most glamorous, a child of high technology. But it is more than a branch of modern science. It is a symbol of the collectivity and continuity of humankind's cultural heritage. This mixture of science and culture is astronomy's strength as well as dilemma. Strength, because support for astronomy transcends all boundaries; dilemma, because this support transcends science also.

As is well known it is very difficult to define things. It has been said that definition should emerge from actual practice. This is largely true. But there are times when concepts need to be defined properly so that future actions can be given a direction.When we were in school we were told in the English class that the word history has no plural. Now I realize that we were wrongly taught. I am inclined to go to the other extreme and assert that there is no history only histories. That is why today the trend is to use the term heritage as in the title for this symposium. Heritage can be seen as the sum total of histories. And yet for the sake of developing a global perspective and planning combined action we must try to develop a universal history.

Elsewhere I have used the term Cultural Copernicanism. Just as Copernican principle in cosmology tells that the universe does not have a preferred location or direction, Cultural Copernicanism would imply that no cultural or geographical area or ethnic or social group can be deemed to constitute a benchmark for judging and evaluating others.Within this framework how do we deal with the past? Past should not be pitted against the present. It must be conceded that modern astronomy is the terminus of an evolutional track. Astronomy (as well as science in general) should be seen as a multi-stage civilizational cumulus where each stage builds on the knowledge gained in the previous stages and in turn leads to the next. In various stages there are invariably deed ends which should be handled with sensitivity. In this context it would be useful to keep in mind a wise statement by Henry David Thoreau: "A man is wise with the wisdom of his time only, and ignorant with its ignorance."

History is an exercise in reconstructing the past that is carried out in the present with an eye on the future. Thus paradoxical as it may seem history is an instrument that converts the past into a bridge between the present and the future. More specifically, history of astronomy is an enquiry into how human perception of their cosmic environment has evolved with time. It is relatively an easy matter to discuss the history of modern astronomy as western astronomy. But if we wish to advance the cause of astronomy, if we wish to see world-wide development of astronomy, we must place post-Galilean developments in a wider spatial and temporal context. Some relevant details of the activities planned by the International Astronomical Union and the United Nations in commemoration of International Year of Astronomy 2009 will be provided.

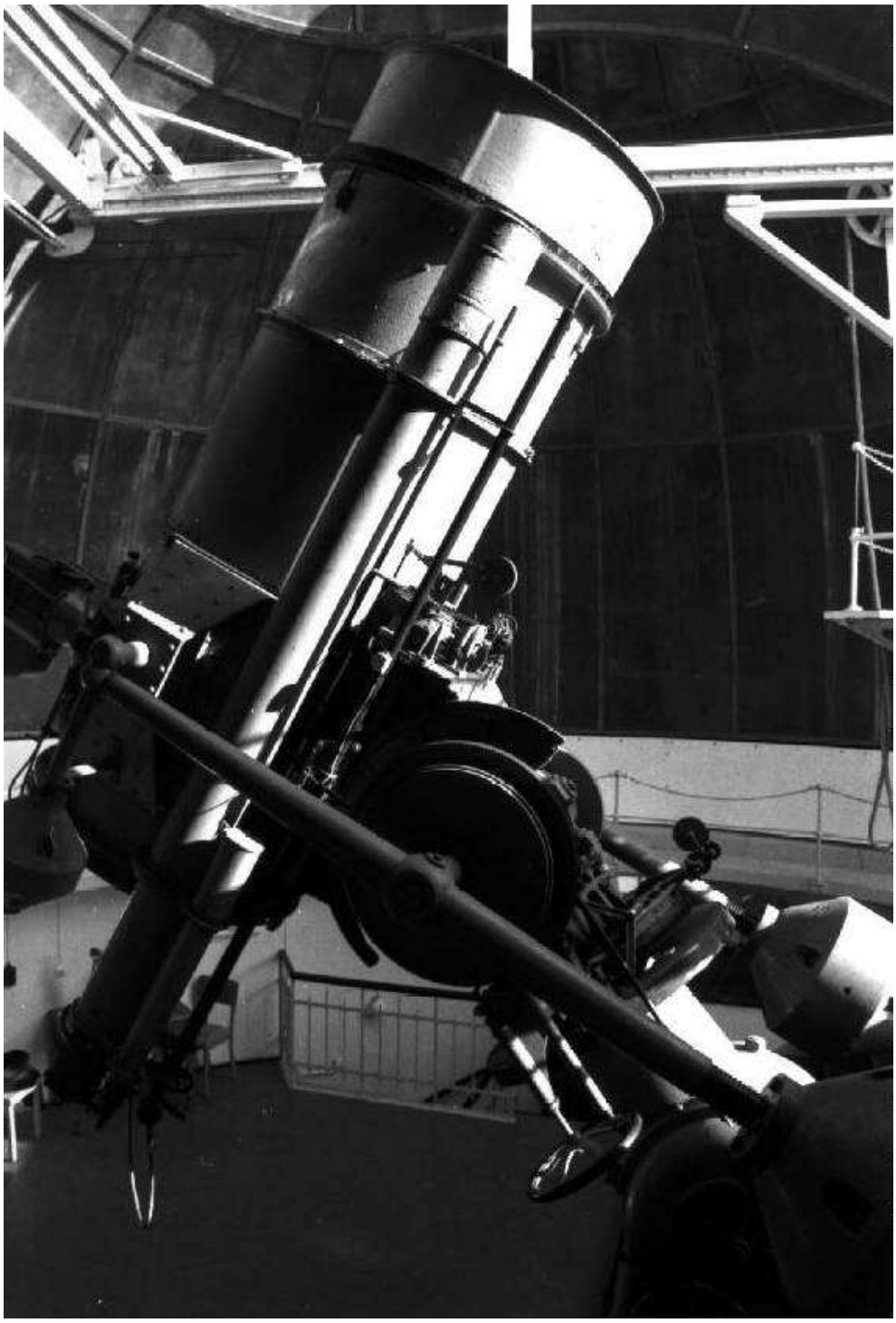

Figure 1.2:
1 m reflector, Carl Zeiss, Jena, 1911
Hamburg Observatory

2. From Classical Astronomy to Modern Astrophysics

Chairperson: Gloria Clifton (Greenwich, UK)

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Wednesday, 15. October 2008, 14 - 16 h
Haus im Park in Bergedorf

2.1 Cultural Heritage of Observatories and Instruments – From Classical Astronomy to Modern Astrophysics

Gudrun Wolfschmidt (Hamburg)

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Until the middle of the 19^{th} century positional astronomy with meridian circles played the dominant role. Pulkovo Observatory, St. Petersburg, was the leading institution for this kind of research. The design of this observatory was a model for the construction of observatories in the 19^{th} century. In addition, in Hamburg observatory and in some other observatories near the coast, time keeping and teaching of navigation were important tasks for astronomers.

Around 1860 astronomy underwent a revolution. In the context of "classical astronomy", only the direction of star light was studied. In the 1860s quantity and quality of radiation were studied for the first time. This was the beginning of modern "astrophysics", a notion coined in 1865 by the Leipzig astronomer Karl Friedrich Zöllner (1834–1882). It is remarkable that many amateurs started this new astrophysics in private observatories but not in the established observatories like Greenwich, Paris or Pulkovo. In Germany this development started in Bothkamp observatory near Kiel, with Hermann Carl Vogel (1841–1907), strongly influenced by Zöllner. An important enterprise was the foundation of the Astrophysical Observatory in Potsdam, near Berlin, in 1874 as the first observatory in the world dedicated to astrophysics – a foundation that inspired others. Important innovations and discoveries were made in Potsdam.

The new field of astrophysics caused, and was caused by, new instrumentation: spectrographs, instruments for astrophotography, photometers and solar physics instruments. In particular, the glass mirror reflecting telescope was recognised as a more important instrument than a large refractor; for the new observatory in Hamburg-Bergedorf a 1-m-reflector, the fourth largest in the world, made by Zeiss of Jena, was acquired in 1911. Another change was made in the architecture, the idea of a park observatory came up, as in the case of Nice observatory, Hamburg-Bergedorf and in America. Finally the Schmidt telescope was the most important and influential invention in the Hamburg Observatory. In the last quarter of the 19^{th} century only a few centres of astrophysics existed in the world. Besides Potsdam one should mention Göttingen, Heidelberg, Bonn and Hamburg in Germany, then observatories in Hungary, Italy, England and France and late, around 1900, also in the United States and India. The change from classical astronomy to modern astrophysics can be seen very well in the case of the Hamburg Observatory around 1900 – concerning the choice of instruments, the architecture and the idea of the astronomy park; all this is an important cultural heritage connected with observatories of this time.

2.2 The Origins and Development of Astrophysical Research at the Nicholas Central Astronomical Observatory in Pulkovo

Prof. Dr. Viktor K. Abalakin (St. Petersburg)

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The Pulkovo Observatory, now the Central (Pulkovo) Astronomical Observatory of the Russian Academy of Sciences, has been inaugurated in 1839. Its traditional field of research work was Astrometry – i. e. determination of precise coordinates of stars and compilation of fundamental star catalogues containing data on stellar positions and proper motions derived from the observations. The discovery of the light absorption in the interstellar space made by Friedrich Georg Wilhelm Struve who was the Founder and the first Director of the Observatory may be mentioned as the first result of an astrophysical significance obtained at the Observatory. The steady development of the astrophysical research in the astronomical world community has found its reflection in the report read by Otto Struve, the second Director of Pulkovo Observatory, in 1866 in the Petersburg Academy of Sciences and entitled "About the Place of Astrophysics in Astronomy". The first astrophysical observations at the Observatory were made by Otto Struve in 1868 who observed the spectrum of the Aurorae. Bengt Hasselberg had made his astrophysical investigations in 1876 through 1886 performing numerous experiments related to investigation of luminescence spectra of gases, especially, of carbides, playing an important role in comprehending the physical nature of comets. He also studied spectra of the Sun and of stars.

The astrophysical studies on a wide scale were performed at Pulkovo Observatory after arrival of Theodore Bredikhine who was the Observatory's Director since 1890 and of Aristarchos Belopolsky who investigated flaring and variable stars, radial velocities of stars and axial rotation velocities of major planets spectroscopically, using new spectroscopes and spectrographs adjusted to great telescopes of the Observatory, including the famous 30-inch refractor manufactured in 1880s by Clarks in the USA. Belopolsky demonstrated experimentally the validity of the Doppler-Fizeau principle and applied it to study of solar spots, flares, eruptions. He also observed spectra of the Sun and of formations on its surface succeeding in measuring the sunspot temperature in 1915 spectrophotometrically. At the same time, beginning in 1906, Gabriel Tikhov studied the colours of various stars, especially, of those belonging to stellar clusters and discovered in 1910 the selectivity effect in the light absorption in the space. Alexis Hanski who obtained excellent photographs of the solar granulation also investigated the meteor spectra. Inna Lehmann discovered variability of the radial velocities of some stars, particularly, of δ Cephei, thus confirming Umov's pulsation hypothesis, and of α Geminorum which is caused by changes of the orbital elements of this eclipsing binary.

2.3 At the Belle Epoque, astronomy and astrophysics at the Observatoire de Paris

Suzanne Débarbat (Paris, France)

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While classical astronomy was a long tradition at the Paris Observatory from the time of its foundation (1667), astrophysics was introduced, by the Admiral Mouchez, then director of the observatory, ten years before the end of the 19^{th} century.

On one side positional, fundamental astronomy and related subjects were well developped, astrophysics was not yet in good position. Photographic techniques were in high level progression with the Carte du Ciel enterprise and the Equatorial Coudé. In 1889, the Admiral created – for Deslandres – a Service de spectroscopie stellaire, officialy mentionned in his 1890 annual report. It includes a long text by Deslandres after only one year of activity, mostly concerning uses, for that purpose, of several instruments installed in the garden.

Other fields were not neglected. Even a new one, issued from the dveloppement of wireless telegraphy came during the first ten years of the 20^{th} century, leading to time signals and new uses for astronomy and connected sciences.

2.4 The Truncated Modernization (1950–1959): Eduardo Röhl and the Observatories of Cagigal and Hamburg – A look from the outside

Pedro Chalbaud Cardona (Mérida, Venezuela)

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At the end of the Second World War a large group of scientists returned to their labs; Astronomy was no exception. Newer and increasingly larger instruments were distinguishable on the horizon. New research programs were dedicated to seek a solution to specific problems and particular subjects and areas. International relations among the observatories of the world would set the stage for what the rest of the 20^{th} century would be.

In Venezuela, the Director of the Observatory Cagigal at Caracas (1888), Dr. Eduardo Röhl (1891–1953) proposed the modernization of the observatory to the President of the Republic, Gen. Marcos Perez Jimenez, to thus place it at level with other scientific institutions in Europe and the United States. His proposal consisted in obtaining a series of pieces of equipment with modest dimensions. However, he did not specify the scientific programs or personnel that would work in the observatory.

Taking advantage of his skill for speaking English and German perfectly, Dr. Röhl started contacts with several observatories: Otto Heckmann (Hamburg), C. B. Watts (USA), A. Dajon (Paris); his attention was particularly focused on the Observatory of Hamburg. There, he realized the advances in technology being implemented. Similarly, the opportunity Venezuela represented to install the biggest and best technology and the advice offered by Heckmann was not wasted. The contracts for the Modern Cagigal Observatory were signed in 1953. The architects were from Hamburg; the Refractor, Schmidt, Reflector, Astrograph and Meridian Circle Telescopes were built by Zeiss (Oberkochen) and Askania Werke.

With the conclusion of the Military Government in Venezuela (1958), the sudden death of Röhl (1959), the radical change in the Directive of the Cagigal Observatory to the hands of the Marines; the modernization project suffered a serious blow. The equipment was stored away, the headquarters of the Observatory was transformed, the tools and equipment scattered and almost forgotten.

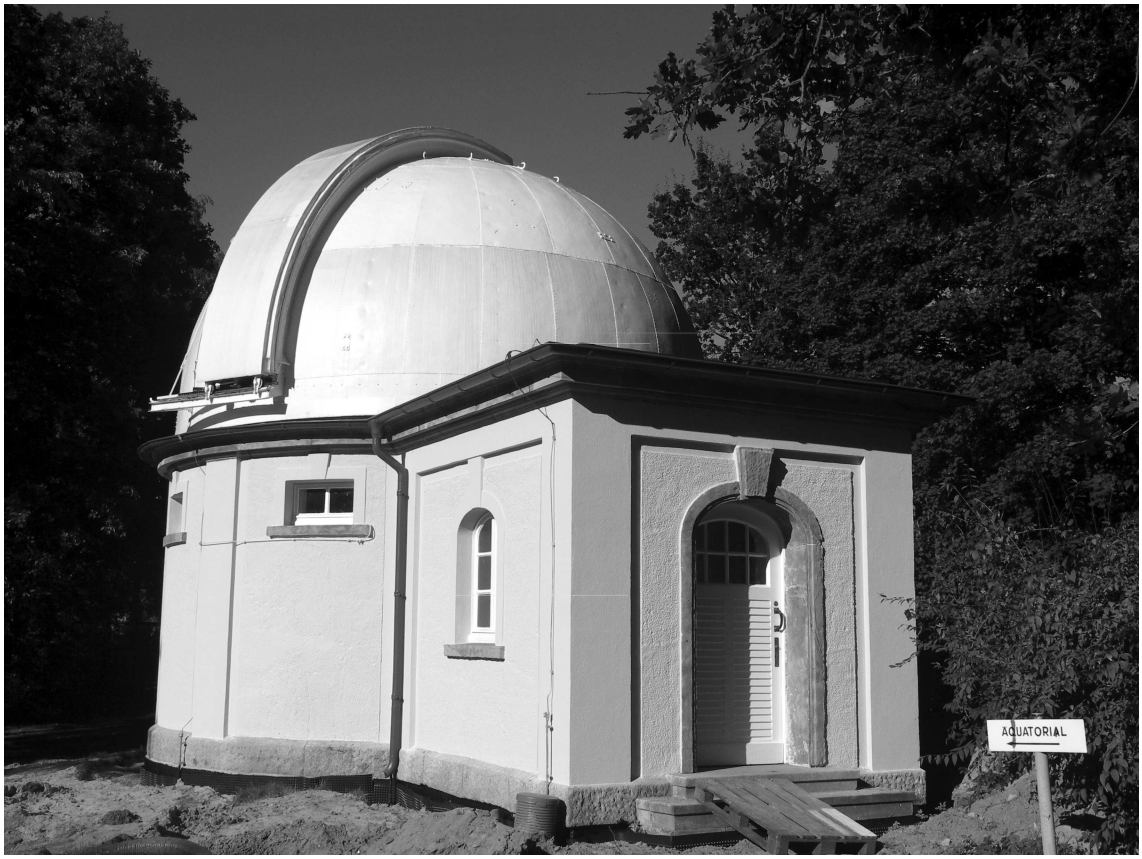

Figure 2.1:
Building of the equatorial telescope, 1867/1909

Hamburg Observatory

3. Hamburg Observatory – History, Instruments, Buildings, Restauration

Thursday, 16. October 2008, 16 h
Hamburg Observatory in Bergedorf

- 16 h – Grußwort (Welcome address):
  Prof. Dr. Jürgen Schmitt, Director of Hamburg Observatory
- Guided tour through the observatory
  (Förderverein Hamburger Sternwarte):
  English: M. Hünsch, G. Wolfschmidt,
  German: A. Seemann, H. Schlepegrell, W.-D. Kollmann.
- 18.00–18.30 h – Peter Müller, Köln, Germany:
  The Observatory of Hamburg-Bergedorf,
  compared with other Observatories about 1900
- 19.30–21.00 h – Panel discussion:
  Observatories as Universal Heritage (Der Weg zum Weltkulturerbe?)
  - Prof. Dr. Michael Petzet, München,
    Präsident des Deutschen Nationalkomitees von ICOMOS
  - Prof. Dr. Karin von Welck, Senatorin für Kultur, Sport und Medien
  - Prof. Dr. Monika Auweter-Kurtz,
    Präsidentin der Universität Hamburg
  - Annette Liebeskind,
    Deutsche Stiftung Denkmalschutz
  - Moderation: Ulf-Peter Busse,
    Bergedorfer Zeitung
- 21 h – Reception in the observatory

3.1 Die Hamburger Sternwarte – Ein Kulturdenkmal von nationaler und internationaler Bedeutung

Agnes Seemann (Hamburg)

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Anfang des 20. Jahrhunderts, als am Standort der alten Hamburger Sternwarte am Millerntor keine sinnvollen Messungen mehr durchgeführt werden konnten, weil die Behinderungen durch Streulicht, Rauch, Erschütterungen und Lärm von Hafen, Industrie und Stadt zu groß geworden waren, stimmten Senat und Bürgerschaft der Freien und Hansestadt Hamburg nach langem Sträuben im Jahre 1901 einer Verlegung nach Bergedorf zu. Richard Schorr, der damalige Direktor der Sternwarte, verstand es in der Folgezeit, die Hamburger Behörden zu einer wirklich großzügigen Neuausstattung zu bewegen. Dies führte dazu, dass Anfang des 20. Jahrhunderts in Bergedorf eine der modernsten und größten zeitgenössischen Sternwarten Europas entstand.

Bis heute ist die Hamburger Sternwartenanlage nahezu komplett erhalten. Das gilt für das Sternwartengelände mitsamt der historischen Gebäude und ihrer Ausstattung ebenso wie für die optischen Geräte und die technischen Details. 1996 wurde die Sternwarte daher als denkmalschutzwürdige Gesamtanlage aus stadt-, kultur- und wissenschaftshistorischen Gründen in die Denkmalliste der Freien und Hansestadt Hamburg aufgenommen.

Aber nicht nur für Hamburg ist diese Sternwarte, die Anfang des 20. Jahrhunderts zu den modernsten und größten zeitgenössischen Sternwarten Europas zählte, von Bedeutung. Neben der Sternwarte in Heidelberg-Königstuhl ist sie die einzige historische Sternwarte in Deutschland, die als moderne Gruppenanlage errichtet wurde, wie sie erstmals 1879–1986 auf dem Mont Gros bei Nizza verwirklicht worden war. Während die Hamburger Sternwarte aber nahezu komplett erhalten ist, stellt sich die 1896–1900 errichtete Anlage in Heidelberg-Königstuhl, die schon zur Bauzeit sehr viel kleiner und bescheidener als die Hamburger Sternwarte war, heute stark verändert dar.

Neben der Anlageform ist aber vor allem auch die instrumentelle Ausstattung der Hamburger Sternwarte von außerordentlicher Bedeutung. Gegen Ende des 19. Jahrhunderts vollzog sich in der Astronomie mit dem Übergang von der klassischen Astronomie zur modernen Astrophysik ein großer Umbruch. Die Hamburger Sternwarte wurde mit herausragenden Instrumenten für beide Forschungsschwerpunkte ausgestattet, sowohl mit einem Großen Refraktor als auch mit Spiegel-Teleskopen.

Der Große Refraktor mit einem Objektivdurchmesser von 60 cm und einer Brennweite von 9 m zählt bis heute zu den größten Refraktoren Deutschlands. Es ist das letztgebaute Instrument der bedeutenden Firma Repsold und das zweitgrößte, das noch vorhanden ist. Die von Carl Zeiss entworfene und verwirklichte Hebebühne, die den Betrieb dieses

großen Refraktors wesentlich erleichterte, ist zudem die erste ihrer Art, die auf dem europäischen Kontinent verwirklicht wurde.

Der Hamburger 1 Meter-Spiegel war bei seiner Indienststellung 1911 das viertgrößte Spiegelteleskop der Welt (nach Mt. Wilson: 1.52 m, Paris: 1.20 m, Lowell-Obs. Flagstaff: 1.07 m). Der Öffnung nach war es bis 1920 und wiederum von 1946 bis 1960 das größte Teleskop in Deutschland. Mit seiner Zeiss-Entlastungsmontierung, die außer in Hamburg nur noch an zwei weiteren großen Spiegelteleskopen verwirklicht wurde, zählt das Spiegel-Teleskop der Hamburger Sternwarte, das zugleich das erste große Zeiss-Teleskop darstellt, zudem zu den ungewöhnlichsten Konstruktionen des Fernrohrbaus. Schließlich gelangen mit Hilfe dieses Instruments durch einen der bedeutendsten Astronomen des 20. Jahrhunderts, durch Walter Baade, zahlreiche Aufsehen erregende Entdeckungen.

Mit dem von der Firma Repsold gefertigten Bergedorfer Meridiankreis mit einem Objektiv von 19 cm Durchmesser und 2,30 m Brennweite wurden bis in die 1960er Jahre die weltberühmten *Bergedorfer Sternenkataloge* erstellt, die die Grundlage der noch heute verwendeten Koordinatensysteme am Himmel bilden. Darüber hinaus diente das Instrument jahrzehntelang der Zeitbestimmung.

Neben diesen großen alten Instrumenten gehört das funktionsfähige Äquatorial aus dem Jahre 1867 zusammen mit seinem ebenso alten hölzernen Beobachtungsstuhl sicherlich zu den bedeutendsten historischen Dokumenten der astronomischen Wissenschaftsgeschichte in Deutschland. Ursprünglich besaß das Teleskop besonders große Teilkreise für direkte Positionsbestimmungen außerhalb des Meridians. Es war das größte jemals zu diesem Zweck hergestellte Äquatorial.

Von den modernen Instrumenten ist das Oskar-Lühning-Teleskop mit dem Ritchey-Chretien-System mit einer Öffnung von 1.20 m und einer Brennweite im Cassegrain-Fokus von 15.60 m das größte Teleskop der Hamburger Sternwarte und gegenwärtig das zweitgrößte Teleskop in Deutschland. Dieses Instrument wurde zudem in jüngster Zeit so aufgerüstet, dass die Bedienung und Beobachtung per Internet möglich ist. Damit hat das astronomische Institut der Hamburger Universität die Geschichte der bedeutenden astronomischen Instrumentenentwicklung, die 1930 mit der Erfindung des „Schmidt-Spiegels"' durch den Hamburger Astronomen Bernhard Schmidt seinen ersten Höhepunkt erreicht hatte, fortgeführt.

Zusammenfassend ist festzuhalten, dass die Hamburger Sternwarte wie kaum eine andere Sternwarte auf der Welt die technische, mit der astronomischen Wissenschaft einhergehende Entwicklung der Teleskoptechnik von etwa 1850 bis zur Gegenwart dokumentiert: Das Äquatorial und der Meridiankreis repräsentieren die Astronomie des 19. Jahrhunderts mit Schwerpunkt auf Positionsbestimmung und visuelle Beobachtung. Der Große Refraktor und der 1-Meter-Spiegel stehen stellvertretend für den Wettstreit zwischen beiden Bauformen am Beginn des 20. Jahrhunderts und für den Übergang zur fotografischen Beobachtungstechnik. Die moderne Teleskoptechnik ist mit dem Oskar-Lühning-Teleskop und seiner modernen Aufrüstung, einschließlich moderner Computer- und CCD-Technik vertreten. Verschiedene Bauformen des Spiegeltelekops (Cassegrain, Nasmyth, Ritchey-Chretien, Schmidt) sind vorhanden. Zudem ist die Hamburger Sternwarte nicht nur die „Geburtsstätte"' des Schmidt-Spiegels, hier ist sogar das weltweit er-

ste Instrument dieses Typs noch vorhanden. Schließlich gibt es noch eine Sammlung weiterer, z. T. historisch bedeutsamer kleinerer Instrumente (Sonnenfinsternisexpeditions-Ausrüstung, AG-Astrograph, Zeiss-Prismenspektrograph, diverse kleinere Geräte).

Auch wenn es auf der Welt ohne Zweifel andere bedeutende historische Sternwarten gibt, stellt die Hamburger Sternwarte für die Zeit der Wende vom 19. zum 20. Jahrhundert in der Kombination der unterschiedlichen Bedeutungsebenen von moderner Anlageform, repräsentativer Architektur, instrumenteller Ausstattung, Bedeutung für die Forschung und ihres Erhaltungsgrades eine Besonderheit dar, die, nach heutigem Kenntnisstand, in dieser Kombination einzigartig ist. Die Hamburger Sternwarte stellt daher ein wissenschafts- und architekturgeschichtliches Kulturdenkmal von nationaler und internationaler Bedeutung dar.

Figure 3.1:
Main Building, Hamburg Observatory

Hamburg Observatory

3.2 Restauration activities of the observatory buildings – past and future

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Der Förderverein Hamburger Sternwarte in Zusammenarbeit mit der Presse machte durch viele Aktivitäten die Öffentlichkeit auf den drohenden Verfall und auf Möglichkeiten zur Rettung der Hamburger Sternwarte aufmerksam.

Ein erster Erfolg war die Spende von 100.000 DM (50.000 Euro) von der Deutschen Stiftung Denkmalschutz – anläßlich einer Benefiz-Gala – für den Erhalt des Meridiankreis-Gebäudes; ergänzt durch eine gleich hohe Summe von Seiten der Universität Hamburg.

Ferner widmete sich der Verein unter Einsatz eigener Geldmittel mit Unterstützung von Denkmalpflege-Institutionen der Sanierung des Salvador-Gebäudes 2003 und des Äquatorial-Gebäudes 2004 und 2005. Zu den Gesamtkosten der Sanierung des Äquatorial-Gebäudes von 42.000 Euro trug der Förderverein 15.000 Euro bei, dazu kamen 23.000 Euro von der Hamburger Stiftung Denkmalpflege und 1500 Euro von der Bergedorf-Stiftung, ferner Spenden von privater Seite. Ferner gelang dem Förderverein für 2006 die Einwerbung europäischer Gelder (ESF-Fond) für kleinere Sanierungsmaßnahmen (Türen und Fenster). Für sein langjähriges Engagement bzgl. der Hamburger Sternwarte wurde der Förderverein im November 2006 mit dem Nationalpreis für Denkmalpflege ausgezeichnet.

Im Frühjahr 2008 wurde die Hamburger Sternwarte aufgrund eines Antrags des Fördervereins erfreulicherweise als national wertvolles Kulturdenkmal anerkannt.

Leider befindet sich besonders das beeindruckende, technikhistorisch wertvolle 1m-Spiegel-Teleskop in einem schlechten Zustand; das gilt auch für das zugehörige Kuppelgebäude und für den 1925 hinzugefügten eingeschossigen Anbau mit Flachdach. Es ist daher geplant, in zwei Schritten zunächst das Gebäude zu sanieren, bevor in einem dritten Schritt die Sanierung des wertvollen Instrumentes in Angriff genommen werden kann. Dem Förderverein liegt ein Kostenvoranschlag des ArchitekturContors vor, der die Behebung der vorliegenden Schäden am Gebäude in zwei Bauabschnitten 2008 und 2009 vorsieht. Durch die bereits erfolgten Sanierungsmaßnahmen sind die Mittel des Fördervereins nunmehr nahezu ausgeschöpft, so dass für weitere dringend notwendige Sanierungen keine eigenen Gelder mehr zur Verfügung stehen. Nach Zusage von Geldern von Seiten des BKM, der Hamburger Stiftung Denkmalschutz und der Deutschen Stiftung Denkmalschutz konnten am 1. Juli 2009 die Bauarbeiten am 1 m-Gebäude begonnen werden.

3.3 The Observatory of Hamburg-Bergedorf, compared with other Observatories about 1900

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Sternwarte Hamburg-Bergedorf 1906–1912 verglichen mit anderen Observatorien um 1900

Die Gründung der Astrophysikalischen Observatoriums in Potsdam/Telegrafenberg 1874, Meudon bei Paris 1875 und Mount Hamilton in Kalifornien 1875 bedeutete Revolution in der Sternwarten-Architektur. Positions-Astronomie war unbedeutend geworden; es waren keine Meridiansäle, also keine strenge N-S-Orientierung, mehr nötig. Die Lage innerhalb einer (Uni-)Stadt war zu ungünstig, wegen Erschütterungen durch Verkehr und künstliche Beleuchtung bei Nacht. Es kamen neue Grundsätze auf: erhebliche Entfernung, einsame, erhöhte (Berg-)Lage, Pavillon-Bauweise: für jedes Instrument eigener Bau in Parkanlage. Weitere Obsservatorien von diesem Typ sind: Pic du Midi in den französischen Alpen ab 1878 als erstes, bleibendes Observatorium im Hochgebirge; Nizza Mont Gros 1879-, Brüssel-Uccle 1883-, Edinburgh Blackford Hill 1892-, Heidelberg-Königstuhl 1896-, (Barcelona Monte Tibidabo 1902-).

Die ursprüngliche Hamburger Sternwarte war bescheidener Längsbau beim Millerntor, seit 1833 staatliches Institut; seit 1906 großzügig neu angelegt 20 km nach NO vom Stadtzentrum in Bergedorf. Außer der (nicht möglichen) Berglage erfüllt sie alle Prinzipien eines modernen Observatoriums: Pavillon-Bauweise im Park, nobler neubarocker Baustil durch Ing. Albert Erbe, der auch Neue Hamburger Kunsthalle mit Kuppel erbaute, Staffelung der Kuppelbauten so, dass nach Süden freie Sicht. Anfangs waren Astrometrie und Astrophysik hier noch gleichberechtigt; es gab noch einen Meridiankreis. Sonst waren die Instrument vielseitig: Großer Refraktor 60 cm : 9 m (Montierung von Repsold), großer Reflektor 1 m : 3 m (Zeiss/Jena). Beide damals die größten im Deutschen Kaiserreich, Lippert-Astrograph, auf eleganter Knicksäule, für Himmelsfotografie. 1931 erfand Bernhard Schmidt hier das Schmidt-Teleskop, bestehend aus spezieller Korrektionsplatte und sphärischem Spiegel – geeignet für "komafreie" Himmelsfotografie, hute verwendet in aller Welt.

Im Zweiten Weltkrieg wurde Hamburg durch zahlreiche, anglo-amerikanische Bombenangriffe schlimm zerstört; die Bergedorfer Sternwarte wurde verschont. Inzwischen sind viele Gebäude mehrfach restauriert – die Gesamtanlage ist denkmalwürdig.

Figure 3.2:
Equatorial telescope (26 cm, 3 m), 1867
and observing chair, Repsold, 1909
Optics: G. & S. Merz, Munich
Mechanics: A. Repsold & Söhne, Hamburg

Hamburg Observatory

4. Astronomical Observatories around 1900

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Thursday, 16. October 2008, 9 - 12.30 h
Haus im Park in Bergedorf

4.1 The material culture of nineteenth-century astrometry, its circulation and heritage at the Astronomical Observatory of Lisbon

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The Astronomical Observatory of Lisbon was founded in 1857 in the sequence of a discussion on stellar parallax measurements involving astronomers from the Observatory of Paris and the Observatory of Pulkovo. The development of this discussion led the contenders to recognize Lisbon as a suitable place to carry out this kind of measurements and thus to foster the field of stellar astronomy. Some local actors strived to keep up with this wave of international interest and establish a first-rank astronomical institution in the Portuguese capital. In order to fulfill this goal, correspondence was intensively exchanged with leading foreigner astronomers and instrument makers. Besides, a Portuguese Navy officer bound to become the first director of the new institution was commissioned to visit several observatories and instrument workshops abroad, and to spend a few years in Pulkovo as a trainee astronomer.

Although founded with generous financial support from the Portuguese crown and lavishly equipped and constructed, the performance of the Observatory of Lisbon was hindered by limiting budgets and a shortage of qualified personnel. Nevertheless, local efforts to improve instruments as well as observation and calculation techniques enabled its astronomers to yield important contributions to positional astronomy towards the end of the nineteenth century and the beginnings of the twentieth century.

The original instruments and facilities of the Observatory of Lisbon, strongly modeled on those of Pulkovo, are very well preserved and remain in a state considerably close to their original form, thus constituting an outstanding extant example of a mid-nineteenth century advanced observatory. In this paper I will address the historical value of this heritage, emphasizing its significance with regard to the circulation and appropriation of the material culture of nineteenth century astrometry.

4.2 Two observatories in Istanbul: from the late Ottoman Empire to the young Turkish Republic

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From the 17^{th} century onward, the Ottoman Empire entered a phase of weakening, as a consequence of many factors including the dissolution of political stability, the loss of territory and decreasing revenue. In the second half of the 19^{th} century, as an attempt to reinforce power of the central authority, the Ottomans undertook major reforms called Tanzimat. During this period, individuals started to establish professional and learned associations similar to those in the West which eventually led to the creation of a Faculty of Science and to the Ottoman University (Darülfünun, 1900).

In this context of reform and opening to the West, the Imperial Observatory (Rasathane-i Amire) was founded in 1865 with the support of France. Its primary aim was to exchange data between European and Ottoman meteorological stations, but it also carried out astronomical observations. The Imperial Observatory occupied several locations before reaching its final setting in Kandilli (1911), on the Asian shore of the Bosphorus.

Following the spirit of the newly founded Republic in 1923, a serious reform of the academic programmes and a purging of the staff of the Ottoman University led to the establishment of the Istanbul University in the historical quarter of Beyazit (1933). The Istanbul astronomical Observatory was founded in the same year and its construction started in 1935. The university reform was largely influenced by the presence of German and other European scholars, many of them Jewish, escaping from Nazi persecution. In particular, Pr. Freundlich from the Astrophysics Observatory of Berlin became the first director of Istanbul Observatory.

The creation of these two observatories will be presented, stressing the connexions with other European institutions that played an essential role in including the Ottoman Empire and then Turkey in the various networks (telegraph, meteorology, astronomy, geomagnetism) that were being set up in the second half of the 19^{th} century.

4.3 Heritage and the observatories in Brazil around 1900, a brief review

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The first systematic astronomical and meteorological observations made in the southern hemisphere were in Pernambuco (Brazil) during the short period of Dutch rule in the region (1637–1644).

Later, from the late nineteenth to early twentieth century, there were three observatories on Brazilian soil: the Imperial Observatory of Rio de Janeiro; the Polytechnic Observatory; and the Central Observatory. The first was established by decree of Emperor D. Pedro I on October 15, 1827, while the second, connected to Universidade do Brasil, was created on July 5, 1881; both were built in the center of Rio de Janeiro. The third observatory in Porto Alegre, southern Brazil, was first planned in 1899. It was eventually inaugurated on January 24, 1908 as part of the School of Engineering.

All three institutions continue to function to this day and their instruments of historical value have been included in preservation projects. A major collection of such instruments is held at MAST, most of whose 2000 artifacts are from the Imperial Observatory (now the National Observatory). Many were produced by German manufacturers, including Gustav Heyde, Carl Zeiss, Askania-Werke, Carl Bamberg and Max Kohl. The buildings of the Observatório Central (1908) and Observatório Nacional (1921) are also preserved. In the latter case, they are listed by the federal and state heritage protection agencies. particularly because the buildings constructed specifically for astronomy research have architectural features typical of the late 1800s and early 1900s which have not been altered over the years.

4.4 The Marseille Observatory: the final move. A case study in the conservation of astronomical heritage

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The 'Observatoire de Sainte Croix' began operations in 1702, during the reign of Louis XIV, as a Jesuit observatory financed by the French naval ministry. It was located in the heart of the old city. By 1750 it was called simply 'Observatoire de Marseille'. The naval ministry continued to finance the observatory, even after the suppression of the Jesuits in the 1760s; but during the French Revolution control was transferred to the newly-created Bureau des Longitudes. In the middle of the 19^{th} century, responsibility for Marseille and other state observatories passed to the education ministry (this continues to the present day). In the 1860s, the Marseille Observatory was transferred to the Plateau Longchamp, about 3 km away. There, for a decade, it was run as an annexe to the Paris Observatory. Léon Foucault's 80 cm diameter telescope, then the world's largest with a silvered-glass mirror, was installed in the new site. Many instruments and archives were transferred from the old site; these now constitute the core of the observatory's historical heritage.

Becoming independent again in the 1870s, the Marseille Observatory was equipped with the standard observatory instruments of the late 19^{th} century, including an equatorial refractor of diameter 26 cm, clocks, and a large meridian circle. At the end of the 19^{th} century the Marseille observatory was officially attached to the University of Aix-Marseille.

The first half of the twentieth century was a less prosperous period for the observatory; relatively few new instruments were acquired. But the years following the second world war brought a complete change. Observing activities were shifted almost entirely to the Observatoire de Haute-Provence, about 100 km to the north. This modern observatory for visiting astronomers had been established before the war by the CNRS (Centre national de la recherche scientifique). But even as on-site observing came to a halt, the 'OM' received increased funding and staff. The astronomers were divided into research groups, one of which, that concerning observations from space, spun off in the 1960s, founding the CNRS's Laboratoire d'Astronomie Spatiale (LAS), some 7 km away.

In 1990, several colleagues collected many of the historical instruments in the former director's office on the ground floor of the observatory's Maison des Astronomes – the building begun in the 1860s to house the observatory director and his assistants. A decade later this 'museum' was extended to most of the ground floor (the former library), with additional instruments and the observatory archives up to ca 1950.

In the second half of the 20^{th} century, the Observatory and the LAS, with dozens of researchers (rather than just a handful), produced a volume of astronomical research

that dwarfs all that was done previously. The historical remains of this modern period are quite different from those from the days when observations were made in-house: auxiliary instrumentation rather than telescopes, but a vast quantity of archives.

The present crisis concerning the astronomical heritage was triggered in 2000 by the (re-)merger of the Marseille Observatory and the LAS, to form the Laboratoire d'Astrophysique de Marseille (LAM). Finally, in the spring of 2008, these two components merged physically in a new building even farther from the city centre. This move presented an opportunity to assemble the more recent historical heritage of the two establishments. Indeed, this was a necessity, as the new building's volume is smaller than the sum of those of the buildings being abandoned. The LAS site, taken over by a property developer, has been totally emptied. Its historical heritage, extremely voluminous and disorganized, is being stored temporarily at the Saint-Charles site of our university – the instruments in the chemistry building and the archives in the university library. The Marseille Observatory site on the Plateau Longchamp has likewise been emptied, for the most part, in preparation for the arrival of a new entity called the Institut Méditerranéen de Recherches Avancées (IMéRA), associated with the three local universities. However, the astronomical public outreach activities (run by an association called Andromède) as well as an historical astronomy unit, are permitted to remain on the site. But because the 19^{th}-century Maison des Astronomes will be entirely occupied by the IMéRA, the entire pre-1950 collection must be removed to the basement of the 1967 'astrophysics building' by 1st September 2008. This basement is already largely filled with the post-1950 instruments and unsorted archives we have managed to rescue.

Where is the 'Observatoire de Marseille' today? Administratively, it still exists – for the moment! – as the astronomy unit of the University of Provence, but is now called the Observatoire Astronomique Marseille-Provence, which federates the LAM (the merged Marseille Observatory plus LAS) along with the Observatoire de Haute-Provence. Will the name 'Observatoire de Marseille' disappear to general indifference? Possibly, but we hope that the name will continue to designate the site on the Plateau Longchamp that has been devoted to astronomy for over 140 years.

My talk will fill in the details and give the latest updates of this conservation effort.

4.5 The University Observatory Vienna

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A few years before 1900 Vienna Observatory has been newly built in the outskirts of the city and moved from the old place near the center of town. The instrumental equipment was choosen in such a way that all work done at the old place could be continued at the new observatory under much better conditions. Astronomers of the Vienna University were well known because of their mathematical abilities, they mainly dealt with the determination of positions and the orbit calculation of comets and minor planets.

The new observatory has been inaugurated 1883. It was designed by two architects, Ferdinand Fellner and Hermann Helmer, who were well known in the Habsburg Monarchy for the construction mostly of theatres. The building still is the world's largest observatory building. The main telescope, a refractor with an aperture of 27 inches and a focal length of 10.5 m was used by Johann Palisa. During his time in Vienna he discovered 94 asteroids.

During the following years Albert von Rothschild donated two further instruments – an equatoreal Coudé telescope used since 1890 mostly for the determination of positions and a normal astrograph built between 1897 and 1907. The equatoreal Coudé after 1909 was equipped with a spectrograph. In those years the city of Vienna grew enormously and quite soon the new observatory was amidst it. There have been plans for a new observatory far away from Vienna, but they could not be realized.

Between 1884 and 1886 a private observatory was financed by Moritz von Kuffner, a Viennese beer brewer. At his observatory young astronomers worked for a few years, some of them became famous later on. As an example I would like to mention Karl Schwarzschild, who worked in Vienna on photometry of stellar clusters for two years.

4.6 **The first 50 years of Konkoly Observatory**

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The second half of the 19^{th} century experienced a revolution in astrophysics. This revolution indicated a new start of professional astronomy also in Hungary by the work of Miklós Konkoly Thege (1842–1916) who is considered as a pioneer of the recent astrophysical activity in our country. He played an outstanding role also in organizing the scientific life and institutions. In 1871. he started the observations in his newly founded institute at Ógyalla. Starting in 1872 the sunspots were regularly observed in the observatory. In 1874. Konkoly started the regular spectroscopic observations of comets and emphasized the importance of parallel laboratory works. An important field of Konkoly's astronomical activity was the observation of surface patterns of planets, in particular of the Jupiter and Mars. The spectroscopic observation of stars formed a significant part of the activity of the Ógyalla observatory. In the last period of the Konoly's era (starting in 1899) stellar photometry became the main profile. At the end of WWI the institute was moved to Budapest from Ógyalla and started a new life based on a completely new infrastructure.

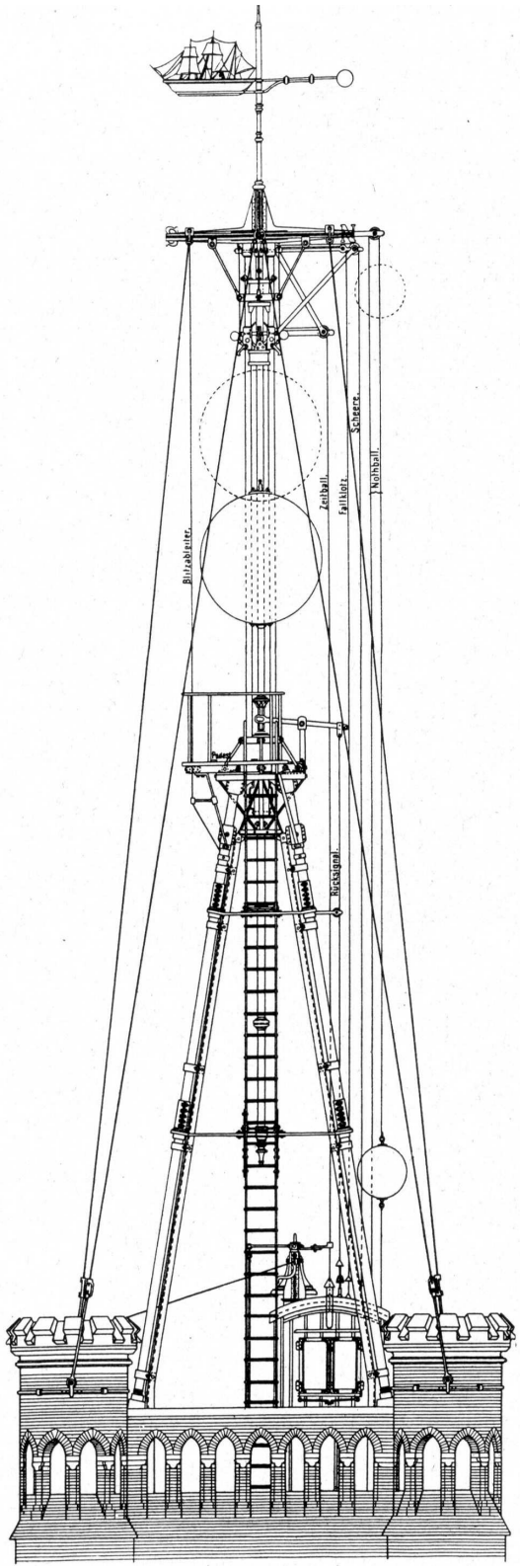

Figure 4.1:
Time ball, Hamburg, 1876 bis 1934

Hamburg Observatory

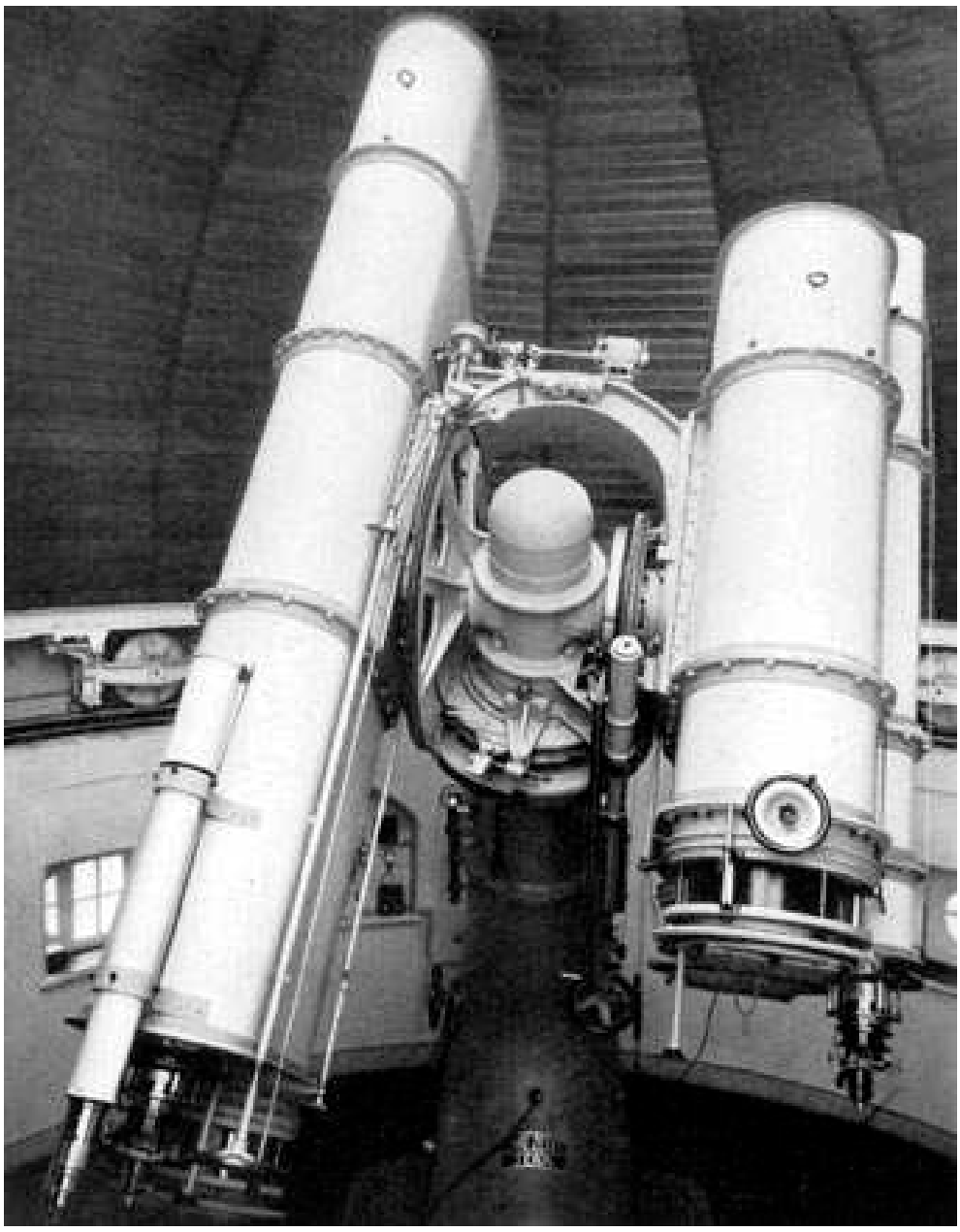

Figure 4.2:
Lippert astrograph:
- Standard Astrograph (1:10) (Carte du Ciel)
with UV triplet L (34 cm/3,4 m), Carl Zeiss, Jena, 1911
- Two short focal length astrographs (1:5) with objektive lens prism, 1914
(30 cm, 1,5 m triplet K and Petzval four lens objective)

Hamburg Observatory

5. Cultural Heritage of Observatories

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Thursday, 16. October 2008, 14 - 17.30 h
Haus im Park in Bergedorf

5.1 Considering heritage as part of astronomy – 100 years of Bucharest Observatory

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Anytime we are considering science's perspectives, thus astronomy, we have to go into the past for better knowing the observer's traditions or of the group in which we are working to see which are the main directions that can be continued or, on the contrary, what is already old and where should we go.

Astronomical experience in Romania is not an exception. There is evidence that proofs interests in knowing the sky of the local population – Sarmisegetuza Sanctuary, for two millennium and others more recently.

This year, the most important Astronomical Observatory from Romania is celebrating its 100 anniversary. Built in Bucharest by the first Romanian mathematicians at Sorbonne, it is nowadays nucleus of the Astronomical Institute of the Romanian Academy.

Marking the most important achievements in space research, in the last century but also those older, represents for the researchers and especially for the public an incentive for the advancement of astronomy in Romania. It happens that 2008, declared in our country the Romanian Astronomical Year, precedes the International Year of Astronomy. These two events brought together is favourable for education and information, and proves that, regardless of time, man can live increasingly better in a Universe that is increasingly knowing more profound.

5.2 The Royal Observatory, Greenwich, London: presenting a small observatory site to the public

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The Royal Observatory Greenwich was created in 1675 on the order of the king at that time, Charles II. Its original purpose was to provide more accurate methods of navigation and specifically to devise a way of finding longitude at sea from astronomical observations. Buildings and telescopes were added over the years and sometimes destroyed to make way for better ones. New responsibilities were added, such as the production of accurate time signals, represented most visibly by the time ball on the roof of the Observatory. At a conference in Washington in 1884 the Greenwich Meridian was adopted as the prime meridian of the World, which has given the Observatory an iconic status as the place where east meets west.

In the 1950s the astronomers left Greenwich for clearer and darker skies away from the London. The Observatory was handed over to the nearby National Maritime Museum to become a historic site open to the public. Decisions were made then about how to present the site as a museum which would probably be controversial today. In 1997 World Heritage Site status was awarded to 'Maritime Greenwich' by UNESCO, including not only the Observatory and Maritime Museum, but also a large section of Greenwich town centre, including the Old Royal Naval College, and Greenwich Park, which is still owned by the Crown. Since then the numbers of visitors to the Observatory have doubled, from about half a million to just over a million last year. This has created new challenges in terms both of public expectation and of managing increased numbers of people on a small site. This paper will look at how the buildings and telescopes have been adapted and changed since the 1950s to meet the Observatory's new role as a visitor attraction, while trying to retain essential elements of its history.

5.3 The Heritage of the 200-year-old University Observatory in Tartu

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The University of Tartu Observatory has served science and education for almost two centuries. The building was completed in 1810 and soon became famous as research centre. In 1964, astronomers moved out to the new location and since then one of the main functions of the Old Tartu Observatory has been to serve as a museum. Since 2005 the Observatory is a UNESCO World Heritage site – a point at the Struve Geodetic Arc. Today, the Observatory building is in bad condition. It will be restored and opened as a museum that will exhibit the heritage to wide audiences. The Old Tartu Observatory is rich in heritage, the most important and famous instrument here is the Fraunhofer Refractor.

The presentation will give overview of the material heritage of the Old Tartu Observatory and how it will be used in the museum in future. Special attention will be paid to the Fraunhofer Refractor and it's restoration in 1993. The paper will also speak about the Struve Geodetic Arc as UNESCO World Heritage site.

5.4 **La Plata Astronomic Observatory**

Sofia A. Cora and Juan Carlos Forte (La Plata, Argentina)

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La Plata, the current capital city of the province of Buenos Aires, was founded on November 19^{th} 1882 by the governor Dardo Rocha, and built on a very innovative design giving emphasis to the quality of the public space, official and educational buildings.

The Astronomic Observatory was one of the first inhabitants of the main park of the city; its construction started in 1883. It included two telescopes that ranked among the largest in the southern hemisphere at that time and also several instruments devoted to positional Astronomy (e. g. a meridian circle and a cenital telescope). A dedicated effort has being invested during the last 15 years in order to recover some of the original instrumentation (kept in a small museum) as well as the distinctive architectural values.

In 1905, the Observatory, the School of Agriculture and the Museum of Natural Sciences (one of the most important museums in South America) became part of the backbone of La Plata National University, an institution with a strong and distinctive profile in exact and natural sciences. The first school for Astronomy and related sciences had been harboured by the Observatory since 1935, and became the current "Facultad de Ciencias Astrónomicas y Geofísicas" in 1983. This last institution carries PhDs programs and also a number of teaching activities at different levels. These activities are the roots of a strong connection of the Observatory with the city.

5.5 Astronomical heritage sites: two early "mountain" observatories on the Mediterranean coast

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The number of French observatories increased significantly during the 1880s. Among the ten establishments in activity at that time, eight were on sites chosen because of their proximity with a faculté des sciences or with Paris, while the remaining two, Nice and Algiers, were installed on hills carefully chosen for their quality as astronomical sites.

We shall compare the scientific and political environments leading to the creation of these two observatories and describe their astronomical equipment and architectural designs. Since in both cases the original astronomical sites are still in activity as research institutes, we shall also evoke the present use of their astronomical heritage.

5.6 **US Naval Observatory (USNO)**

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Founded in 1830 as the Depot of Charts and Instruments, the US Naval Observatory (USNO) is one of the oldest continuously operational scientific institutions in the United States. Among its first tasks were testing, rating and evaluation of various US Navy equipment (such as ships' chronometers) as well as the dissemination of time, first through its historic time ball and later through direct input via the Western Union telegraph.

Fundamental Astrometry and maintenance of the Fundamental Reference Frame were among its earliest charters and were the subject of a long standing collaboration between the USNO and Hamburg Observatory. There have been two main USNO campus locations since 1844; the first was a region of Washington with the ominous astronomical name of "Foggy Bottom", which it occupied until 1893, when the USNO moved to its current location in "Georgetown Heights". The activities and history of the observatory from approximately 1850 to 1950 are described with special attention to work on double stars.

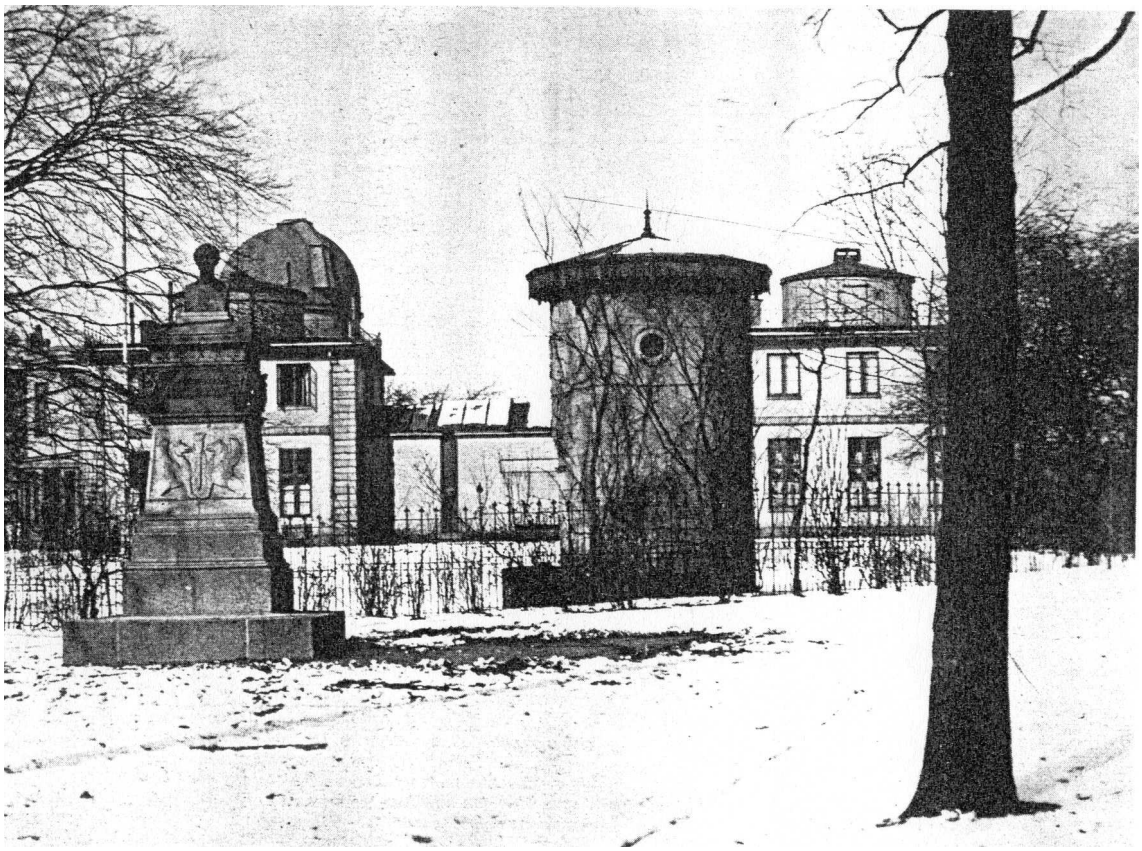

Figure 5.1:
Hamburg Observatory near Millerntor (* 1825),
transferred to the State in 1833

Hamburg Observatory

6. Senatsempfang anläßlich 175 Jahre Hamburger Sternwarte im Rathaus am 16. Oktober 2008, 19 - 22 Uhr

Rathaus Hamburg – City Hall

- Grußwort (Welcome) – Staatsrat Bernd Reinert,
  (State Secretary of the Ministry of Science and Research)
  Behörde für Wissenschaft und Forschung (BWF)
- Grußwort – Frau Prof. Dr. Monika Auweter-Kurtz,
  Präsidentin der Universität Hamburg
- Vortrag: Prof. Dr. Rudolf Kippenhahn (Göttingen):
  Faszination Astronomie - Die letzten zwei Jahrhunderte
- Vortrag: Prof. Dr. Dieter Reimers (Hamburg):
  Geschichte und Zukunft der Hamburger Sternwarte

Empfang – Reception
(Einlaß nur mit Einladungskarte –
special invitation card necessary)

6.1 Faszination Astronomie: Die letzten zwei Jahrhunderte

Prof. Dr. Rudolf Kippenhahn (Göttingen)

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Der Zeitraum zwischen der Gründung der Hamburger Sternwarte und der Gegenwart umspannt den Übergang von der klassischen Astronomie zur modernen Astrophysik. Die Hamburger Astronomen sind diesem Trend ihrer Zunft gefolgt und haben selbst dazu beigetragen.

Im Vortrag wird gezeigt, wie sich durch die Entwicklung der Teleskope unser Weltbild veränderte. Man lernte, dass das Weltall expandiert und dass nicht nur Licht, sondern auch Radiowellen aus dem Weltall zu uns dringen.

Nach dem Zweiten Weltkrieg wurde den Astronomen durch die Weltraumtechnik das gesamte elektromagnetische Spektrum des Weltalls zugänglich. Man entdeckte Sterne, die Röntgenstrahlen aussenden und solche, die ihr Licht nicht gleichförmig abstrahlen, von denen das Licht vielmehr in Form von Lichtblitzen ausgeht. Radiowellen lenkten das Interesse auf gewaltige Strahlungsquellen, die sich als Zentren ferner Sternsysteme entpuppten, in die Gasmassen stürzen und strahlen, ehe sie in einem Schwarzen Loch für immer verschwinden.

6.2 **Geschichte und Zukunft der Hamburger Sternwarte**

Prof. Dr. Dieter Reimers (Hamburg)

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Die Hamburger Sternwarte wurde ab 1821 auf Initiative von J. G. Repsold, der die Instrumente stellte, mit öffentlichen Mitteln auf dem Holstenwall errichtet. Sie wurde am 31. Oktober 1833 Staatsinstitut, ermöglicht u. a. durch eine großzügige Stiftung Hamburger Kaufleute. Der Gründer J. G. Repsold, Oberspritzenmeister der Hamburger Feuerwehr, war 1830 bei einem Brand ums Leben gekommen. Erster Direktor wurde deshalb Charles Rümker, ein erfahrener Astronom und Navigationslehrer, der beide Ämter, Sternwartendirektor und Leiter der Navigationsschule, in Personalunion vereinigen konnte. Aufgabe der Sternwarte war im 19. Jahrhundert vornehmlich Dienst für die Schiff"|fahrt mit genauen Sternpositionen und Zeiten.

Forschungsinstitut wurde die Hamburger Sternwarte erst ab 1912 durch den Neubau in Bergedorf als eines der damals weltgrößten Observatorien mit modernsten Instrumenten. Die Sternwarte erlebte in den 20er Jahren eine Blütezeit, verbunden mit den Namen des bedeutenden Astronomen Walter Baade und des Optikers Bernhard Schmidt.

Wichtige Entwicklungen der Nachkriegszeit waren der Bau des Großen Hamburger Schmidtspiegels (1954), der 1978 nach Südspanien umgesetzt wurde und in den 80er und 90er Jahren für eine großflächige Durchmusterung nach Quasaren eingesetzt wurde, sowie die Gründung der Europäischen Südsternwarte (ESO) mit Zentrale in Bergedorf und Otto Heckmann als erstem Generaldirektor. Ab 1968 Universitätsinstitut, hat sich die Hamburger Sternwarte zu einer blühenden Stätte der astrophysikalischen Grundlagenforschung entwickelt (Gravitationslinsen, Sternentwicklung). Sie ist heute einer der deutschen Hauptnutzer der vom Bund finanzierten Großteleskope am Boden (ESO, Calar Alto) und im Weltraum (Hubble Space Telescope, Röntgensatelliten) mit Schwerpunkten in der Forschung Kosmologie, Physik von Sternen und Planeten sowie Computational Astrophysics.

Die Zukunft der Forschung liegt in der für Hamburg kostenlosen Nutzung der vom Bund finanzierten Großobservatorien (ESO/VLT, HST, XMM-Newton, ...) sowie der z. T. gebauten bzw. geplanten Großgeräte (ALMA, JWST, LOFAR, ELT, Planck etc.). Wir leben in einem goldenen Zeitalter der Astronomie.

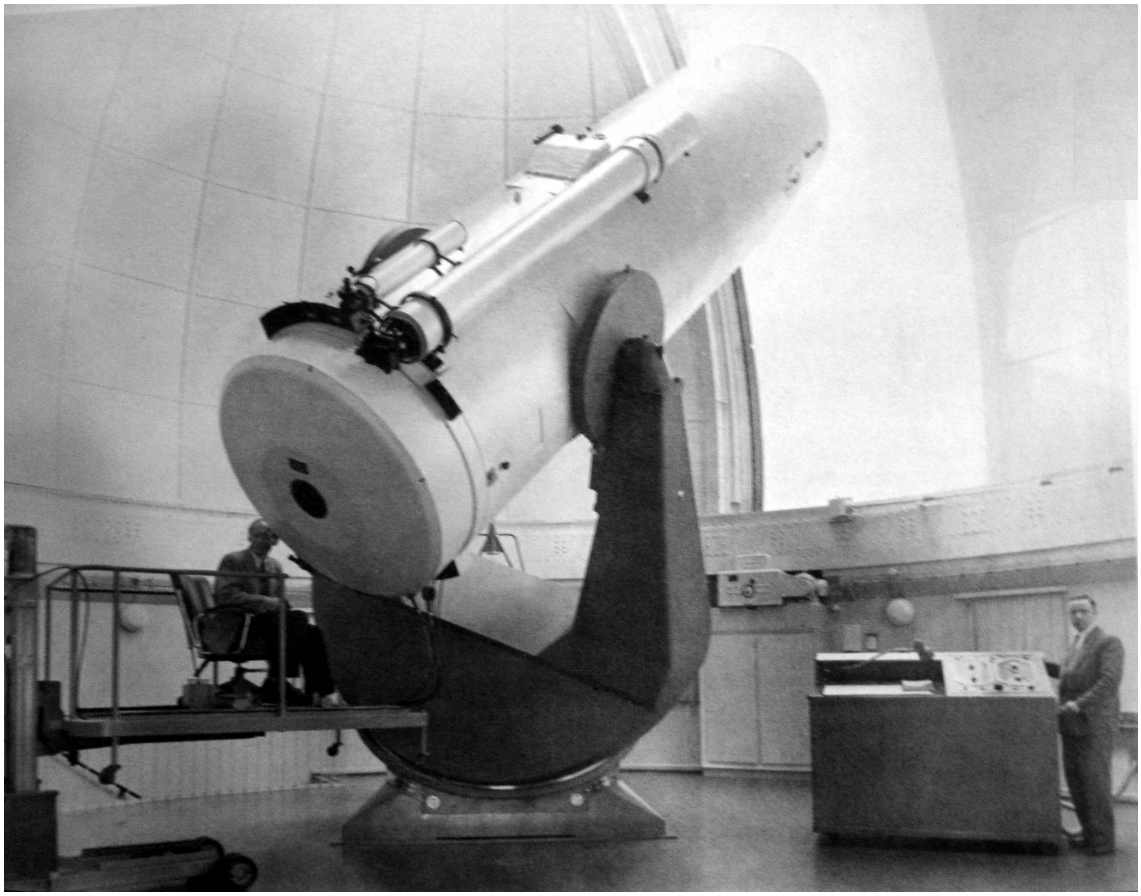

Figure 6.1:
80-cm-Schmidt-telescope, Hamburg Observatory, 1954

Hamburg Observatory

7. Instruments, restoration and virtual heritage

Chairperson: Paolo Brenni (Florence, Italy)

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Chairperson: Inga Elmqvist Söderlund (Stockholm, Sweden)

Observatoriemuseet
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Friday, 17. October 2008, 9 - 12.30 h, 14.00 - 15.30 h
Haus im Park in Bergedorf

7.1 The architectural and instrumental heritage of the Strasbourg university observatory

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Figure 7.1:
General view of the University of Strasbourg: around the new botanical garden, the 'Great Dome' of the Observatory (to the left), the greenhouses (to the right) and the buildings of the institutes of botanics and physics.

(Glass plate photography of about 1880 – Strasbourg University Archives)

When, in 1872, Alsace was handed over to Germany, Emperor Wilhelm I decided to make Strasbourg the showcase of his empire, and in particular to build a prestigious university and an observatory. The construction of the observatory was entrusted to the astronomer August Winnecke (1835–1897), former director of the Pulkovo observatory, and to the *Baumeister* Hermann Eggert. Begun in 1876, the work was completed in 1880. The astronomical instruments, ordered from German makers, were installed during the winter of 1880–1881, and the observatory was inaugurated on September 22, 1881 at the general assembly of the Astronomische Gesellschaft, the international association of astronomers, whose secretary was Winnecke. Marking the south-eastern extremity of the 'imperial axis', the architecture of the university observatory harmonizes perfectly with the new German city built on the former French parade grounds. The astronomical heritage operation conducted at the beginning of the present decade provides a richly documented and illustrated inventory of both the architecture and instruments of this institution. This work has also highlighted the unique quality of the collection of instruments, befitting the long and complex history of this institution.

7.2 **Prague and Ondřejov observatory**

Prof. Dr. Martin Šolc (Prague, Czech Republic)

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Before 1900, only few astronomical observatories existed in Bohemia: (1) The Astronomical Tower of Clementinum College in Prague was built by Jesuits in 1722, for daily observations reconstructed and equipped in ca 1751–1755. After suppression of Jesuit order in 1773 it belonged to the state and its director became "Astronomer Royal". The main tasks were timekeeping, positional astronomy and education of university students. After split of the university onto national parts in 1882, the observatory was incorporated into the German part. (2) Astronomical tower of Jesuit college in Komotau (now Chomutov). It served later to the town gymnasium, that housed in the buildings of the former college. (3) The private observatory of baron John Parish was situated in garden of his castle in Senftenberg. For scientific work, Parish invited Danish astronomer Theodor Ambders Brorsen. This well equipped observatory consisted of two domes, one intended for an equatoreal telescope and other for a meridian circle and geomagnetic and meteorological instruments. Unfortunatelly, the observatory existed only in 1846–1859. (4) The observatory pavilion of the Czech part of the Prague university was built in the garden of the Czech Astronomical institute by professor August Seydler in 1888–1891. After 1900, the institute moved to Prague-Smíchov and a similar pavilion was erected on the new site, where it was in operation until 1949. (5) The private observatory of Vojtech Safarík, professor of chemistry and astronomy at Prague university had address Copernicus Street No. 1 in Prague-Weinberge. (6) The private observatory in Ondrejov was founded on 21st January 1898 by Josef Jan Fric, owner and director of factory producing optical and fine mechanical instruments.

On this day, exactly one year after the untimely death of brother Jan, Josef Fric purchased a considerable area of land on and around the hill called Manda (528 m above the sea level), on border of the village Ondrejov, about 40 km south-east of Prague. Fric anticipated growing air and light pollution near the large town and so he looked for a distant site south of Prague, but within one day of drive by a horse team. The observations started in a provisional wooden shed in 1900–1901. The villa with laboratory and study rooms was inaugurated in 1905, two domes were built in 1908–1912. The architectonic style is an excellent Art Nouveau, designed by Josef Fanta, professor of Prague polytechnics, whose other famous works are Prague main railway station and Peace Memorial of Battle by Austerlitz. Two outstanding personalities inspired brothers Fric to devote the life to astronomy and to build an observatory – Jan Neruda, journalist, writer and poet, and professor Vojtech Safarík (1829–1902), tireless observer of variable stars.

The west dome housed a double astrograph, developed in 1895–1915 by Fric and Frantisek Nusl, professor of astronomy at Prague university. Both astronomers invented and constructed also an astrometric instrument called circumzenital and gained international reputation with it. The prototypes were installed in the small houses with tilt roofs. The central dome was equipped by a telescope with 8-inch objective lens made by Alvan Clark – from bequest of Safarík. Nusl administrated the observatory as director since the begining until the World War II. In 1928, Fric donated the observatory to Charles University by occasion of the 10 years anniversary of Czechoslovak Republic. After the constitution of Czechoslovak Academy of Sciences in 1953, the Ondrejov observatory became the main part of the Astronomical Institute.

7.3 **Italian Astronomical Observatories and their historical instruments collections**

Dr. Ileana Chinnici (Palermo, Italy)

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Italian Observatories kept an historical heritage unique for quantity and quality. Important efforts have been made in the recent years to preserve the historical collections and promote their exhibition in order to reinforce a "conservation" mentality. In 2002 the National Institute of Astrophysics (INAF) has established a "Servizio Musei" (SM) aimed at preserving the historical instruments collections in its observatories; at present, the Servizio Musei is working at AStrum 2009, a special exhibition of historical materials kept in the INAF Observatoires. A brief description of the collections and of the SM activities will be given in this talk.

7.4 Advent of Astronomical Instruments and their impact – the Indian context

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After the pioneering venture of Portuguese on to the Indian soil, several European countries landed in India. Keeping the political and cultural impacts aside, the valuable contribution towards development of astronomical instruments is discussed here. By 1900 there were several telescopic observations reported from India and several instruments developed for the solar and stellar observations. That made Kodaikanal as one of the best solar observatories of the twentieth century.

Kodaikanal observatory not only had solar imaging facilities but stellar spectrographs. Comet Halley's apparition in 1910 has been successfully documented. Coronographs, spectrographs, polarimetric techniques and photometers were also available in India. The Great Trigonometric Survey of India was another successful project.

The impact of these on the overall development of modern science in India is discussed here with special emphasis on instrumentation.

7.5 The telescopes of Hamburg Observatory – history and present situation

PD Dr. Matthias Hünsch (Hamburg)

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The relocation of Hamburg observatory and its move from the city centre to Bergedorf at the beginning of the 20^{th} century fell into the period of transition from classical astronomy to modern astrophyscis. Therefore, the selection and dimensions of the new instruments allowed to perform scientific progress in both fields of astronomical research. On the one hand, a Repsold transit circle and a large refractor stands for the continuation of the classical business like time keeping service and astrometry. On the other hand, a large Zeiss reflector and a triple astrograph represented the rise of astrophysical research topics and methods.

In the following decades, additional instruments for solar observations, photographic astrometry, photometry, spectroscopy, and the invention of the Schmidt telescope by Bernhard Schmidt at Hamburg observatory lead to a nearly unique collection of essentially all kinds of astronomical telescopes, including a large Schmidt telescope and modern reflectors.

Most of these instruments are still preserved at Bergedorf, although partly not used for scientific purposes any more. They illustrate to a large degree of completeness the development of astronomical telescopes and observation techniques from the mid 19^{th} century until present.

7.6 Large devices of industrial culture: the preservation of their historical evidence

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Development of material science and engineering technology is present in devices of the last 150 years. How can the historical evidence of their construction and use, the transfer of technological stages of development be preserved as a special quality in cultural tradition?

The conservation of technical artefacts as a cultural heritage of western civilisation has developed scientific methods of conservation so as to respect their authenticity as materialised references of the past. During the last fifteen years these methods have been evaluated in the unique training program for this specialisation of conservation discipline at the FHTW Berlin, University for Applied Sciences. They are enough standardised now to be applied without hesitation on objects being kept at the indoor situation of a museum or private collection. It is much more difficult to keep devices outside or – as is the case in Observatory – at climates changing between inside and outside situations.

The paper will show a few examples of how to develop concepts for conservation and how it is technical possible to keep the very important original surfaces of the objects, their authentic materiality. As soon as the objects are kept as part of cultural history or history of science they change their function and can not be kept in the same manner as before. They give evidence of their materiality. The archaeometry of modern times is a new and expanding branch of historic research. Moreover the surface of a historic device is the point of contact between passed times and the presence – for the general public as much as for the scientists. It will demonstrated how large the loss of historic information and thus of cultural value of objects can be by renovation instead of considerate conservation. Some examples of careful conservation works done on big objects other than from observatory are presented.

The paper will than summarise the possibilities and difficulties of doing such work on large devices still in use. The scientific research in this specialisation of conservation has only just begun und will be continued in large scientific projects in future.

7.7 The 1m-Reflector – an object of technical heritage and a concept of its restoration / preservation

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The 1m reflector telescope is an almost 100 year old device that is particularly relevant to the history of technology – not only due to its special design, but as it is still in a fully functional condition.

With its traces of use and the conversions and additions made over time it is evidence of a long period of astronomic research.

The telescope offers an extremely rare value of authenticity that should be preserved as it is almost in its original condition and "true" context. The lecture presents a concept of preservation for this device of technical heritage and envisions which measures would be necessary to preserve the substance and why it would be wise to preserve individual traces of ageing and usage.

7.8 Non astronomical research in astronomical observatories (The scientific heritage of Italian astronomical observatories)

Dr. Paolo Brenni (Florence, Italy)

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For centuries astronomical observatories, which have been built for observing and studying the sky, also proved to be ideal places for non astronomical measurements and researches. Their peculiar architecture, their special location, the constant presence in situ of scientifically trained personnel often contributed to transformed them in multi-functional laboratories. Meteorology found in the observatories the best locations for installing its instruments such as barometers, thermometers, hygrometers, anemometers, etc.

When in the late 19^{th} century astronomical observatories abandoned the centres of the cities, where traffic vibrations and light pollutions disturbed the observations, the new locations proved to be ideal also for sophisticated geomagnetic measurements. In fact, these measurements had to be done far away from the electromagnetic disturbances produced by the first electric networks and by the urban tramway lines. On the other hand, astronomical observatories located on the top of mountains gave the possibility of studying the phenomena atmospheric electricity. Furthermore, also some of the pioneering research in the field of seismology was done in the observatories. My paper will illustrate this probably less known aspect of their history.

7.9 Real and Virtual Heritage – Digitized Photographic Plate Archives in Astronomical Observatories – Part 1

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Part 1: Historical astronomical plate archives in Sonneberg, Bamberg and Hamburg observatories, the evolution of astrophysics and their influence on human knowledge and culture

Astronomical Photographic Plate Archives – an Overview. Introduction to Plate Archives in Bamberg and Hamburg

At the end of 19^{th} century the formation and development of photographic methods and techniques had reached a level of sufficient stability for productive usage in astronomy and astrophysics. The fundamental meaning of star light analysis for astrophysics by increasing discoveries of Variable Stars and the systematic search for moving Solar System objects had basically driven the beginning of large photographic sky patrols at that time, using photographic glass plates as detectors and information storages.

Sky Patrols, especially systematic long-term monitoring of the whole sky or of well defined selected areas and Sky Surveys were (and still are) an important key method that forced the evolution and progress of astrophysics. Important scientific results by famous astronomers, for example Walter Baade, Cuno Hoffmeister and Harlow Shapley depended on the analysis of photographic plates.

Today, there are around 50 photographic plate archives world-wide. Most of them, unfortunately, are in a quite poor condition and not yet digitized. Following Harvard College Observatory with an estimated total of 500,000 plates, Sonneberg observatory harbours the second largest archive world-wide (around 300,000 plates) among other large ones in Germany like Bamberg (40,000 plates) and Hamburg (35,000 plates).

These plate archives form an important heritage with a total of roughly two million direct plates and some ten or hundred thousands of spectroscopic plates. A lot of progress has been made by transforming this real heritage to a virtual one by systematic digitisation of the plates, but perhaps only 15% of them have been digitized so far. Although technical problems as the rapid changes in information technology, formats, description languages and limited life times of various storage media are not negligible the main problem remains the poor funding of different digitisation initiatives throughout the world.

Part 2: The Plate Archive in Sonneberg – Digitisation, Preservation and Scientific Programme – cf. Peter Kroll

7.10 Real and Virtual Heritage – Digitized Photographic Plate Archives in Astronomical Observatories – Part 2

Dr. Peter Kroll (Sonneberg)

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Part 1: Astronomical Photographic Plate Archives – an Overview. Introduction to Plate Archives in Bamberg and Hamburg – cf. Björn Kunzmann

Part 2: Historical astronomical plate archives in Sonneberg, Bamberg and Hamburg observatories, the evolution of astrophysics and their influence on human knowledge and culture

The Plate Archive in Sonneberg – Digitisation, Preservation and Scientific Programme

We show the example of Sonneberg Observatory with its still operating sky patrol, where the digitisation of plates of the eighty years uninterrupted monitoring was initiated by a private company. Within four years more than 200,000 plates have been scanned. The digital data give insight into new long-time phenomena we briefly sketch.

Preserving the original plate archives and digitising them would help us to keep the contained information as our storage of cosmic evolution.

This lecture will be divided in two parts. Part one will mainly give a general introduction to astronomical plate archives, describing their fundamental meaning for the development of astrophysics and including an overview of plate archives in Bamberg and Hamburg observatories. Part two will give a comprehensive introduction to the well-know plate archive in Sonneberg, reporting the works of digitisation, preservation and current scientific programme.

Figure 7.2:
Meridian circle building

Poster

8.1 Istanbul University Observatory with its Past, Present, and Future

Gaye Danişan and Füsun Limboz (Istanbul)

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Astronomy and Space Science Department
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In this poster, Istanbul University Observatory is introduced with its short history and present time situation. Istanbul University Observatory is the first education / research institution of Turkish Republic. It is established under the direactory of Dr. F. Freundlich after 1933 University Reform. In the present, the Observatory, which is known with the solar photospheric and chromospheric observations, is a part of Istanbul University, Science Faculty, Astronomy and Space Science Department.

Figure 8.1:
Meridian circle (19 cm), A. Repsold & Söhne, Hamburg, 1909
(Perth 1967 bis 1987)

Hamburg Observatory

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