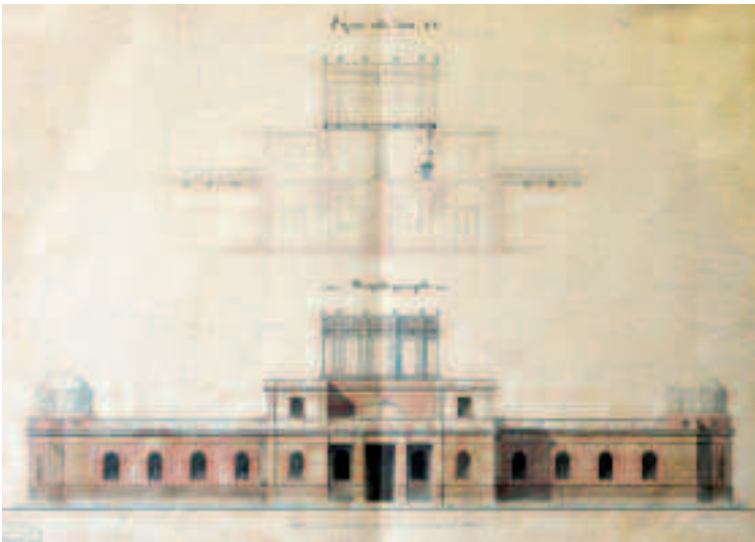


In the *Dizionario geografico fisico storico della Toscana* (*Physical geographical historical dictionary of Tuscany*, 1833) written by Emanuele Repetti, Arcetri is described as a hill on the southern outskirts of Florence comprising a group of small villages, beautiful villas and country houses between San Miniato and the Villa of Poggio Imperiale, continuing towards Costa di San Giorgio, Belvedere and Boboli.

The countryside around Arcetri is known for its beautiful panorama and for its historical and scientific background. The Villa “Il Gioiello” where Galileo Galilei spent the last years of his life and the convent of San Matteo where his daughter Suor Maria Celeste resided, are all located near the Observatory.

But above all, Arcetri is known for its scientific institutes: the Observatory, the National Institute of Applied Optics, the Galileo Galilei Institute for Theoretical Physics, and the Department of Astronomy and Space Science of the University of Florence.

Plan of the new Observatory to be built on the “Podere della Capella” on the top of the Arcetri hill, [before 1872]



The history of the Arcetri Astrophysical Observatory is preserved in the Observatory Archives and a wide collection of papers and correspondence documents the development of Italian astronomical research during the nineteenth and twentieth centuries.

---

THE ARCE TRI ASTROPHYSICAL OBSERVATORY  
AND ITS HISTORY

---

Although astronomical studies in Tuscany go back to the times of the Accademia del Cimento (1657) and despite the small group of physicists formed by Pietro Leopoldo I di Lorena, who also supplied the Observatory with astronomical and meteorological instrumentation, a real school of astronomy only emerged on the 20<sup>th</sup> of February 1807 when the queen of Etruria, Maria Luisa, destined the “Real Museo” (Royal Museum) for public education.

The chair of Astronomy was given to Professor Domenico De’ Vecchi, who in the first edition of the *Annali* described in detail the situation of the astronomical and meteorological observatories, the activities carried out in each one, and the material for his lessons. At that time, the observatories were annexed to the Museo di Fisica e Storia Naturale (open to the public from 1778) in via Romana, and installed on the tower (Specola) of the antique Palazzo Torrigiani.

De’ Vecchi assessed the situation, the state of the instruments and the observations that had been carried out. He emphasized that the place in which the observatory stood was very inadequate and that the staff was forced to work in difficult conditions. “The observatory building, although apparently elegant, is nei-

Title page of the “Annali del Museo Imperiale di Fisica e Storia Naturale di Firenze”, 1808





Portrait  
of G.B. Amici

ther the most favourable for observations nor the most comfortable for the observer. Without even considering the state of its horizon, which is dominated (with the exception of only one side) by buildings and the nearby hills, whoever chose the collocation of the observatory failed at the outset. The meridian openings of the fixed instruments are neither comfortably nor readily practicable. Moreover, the building continues to move slowly towards the West, which causes continuous alterations in the instrumentation.”

In 1829, G.B. Pons, a French citizen, famous for his many discoveries of comets, succeeded De’ Vecchi as chair of astronomy, and in 1831, the Granduca Leopoldo II di Lorena nominated Giovan Battista Amici from Modena to become director of the Florentine institute. First a physicist, but above all an expert in optics, upon his arrival in the observatory Amici converted the ground floor of the Museum into a workshop for the construction of instruments, microscopes, and astronomical lenses. This workshop was the beginning of what will later become the *Officine Galileo*. Amici constructed a glass objective of 36 cm in diameter, among the largest existing at that time, which was used up until 1925 with a modified and more appropriate mounting support, and is still housed at the Arcetri Astrophysical Observatory.

In 1859 Giovan Battista Donati from Pisa became director of the Observatory but he had been part of the Observatory staff since 1852 when he was 26 years old; he had collaborated with Amici on the observation of comets (in June 1858 he discovered a very bright comet, visible to the naked eye, that was named after him) and the study of stellar spectroscopy. Donati participated in scientific expedi-

tions to observe the total eclipse of the sun in 1860 (18 July) in Torreblanca (Spain), and later in 1870 (22 December) in Augusta (Sicily). Both Amici and Donati enriched astrophysical research in Florence, by leading observational campaigns, by developing instrumentation, and by establishing international contacts.

The inadequacy of the premises assigned to the Observatory became more and more evident: the building was unstable and its instability compromised the reliability of the measurements. It was at this time that other more suitable sites were considered, among which the Palazzina del Cavaliere inside the Boboli gardens.

Donati, aware of the importance of a clear atmosphere and after consulting documents written in 1751 by the astronomer Tommaso Perelli, ex director of the Specola Astronomica di Pisa, decided to construct the new Observatory on the hill of Arcetri. A document kept in the State Archive of Florence and later published in the journal "L'Universo" reveals that Tommaso Perelli had in fact suggested building the Observatory on the "pleasant suburban hills surrounding Florence following the English example of Greenwich which is only about a mile from London."

Donati dedicated much time and energy to the construction of the new Observatory on the Arcetri hill. It was inaugurated on the 27<sup>th</sup> October 1872. The Observatory comprised a central building on which the astronomical tower was situated, and two wings upon which small domes were built to host smaller instrumentation. The building seemed inspired by the Observatory of Pulkovo near Saint Petersburg. Unfortunately Donati was not present at the inauguration because of a fractured leg. A year later Donati, on his return from a meteorology conference in Vienna, died prematurely of cholera.



Portrait of A. Abetti

During the years that followed, the scientific research and the construction of instruments came to a standstill, partly because the new Director Ernst Wilhelm Tempel did not have a solid scientific background. Nevertheless, he was an extraordinary draftsman and lithographer, and observed and discovered many comets, small planets and nebulae. In 1879 he was awarded the *Premio Reale per l'Astronomia* (Royal Prize in Astronomy) of the Accademia dei Lincei for his drawings of nebulae.

His most important work, *Über Nebelflecken*, was published in Prague in 1885.

After Tempel's death in 1894, the Observatory went into such a period of decline that even the building had to be extensively restored. The same year Antonio Abetti from Padova became the new Director of the Observatory. His main field was positional astronomy, and he gave new impetus to scientific research at Arcetri.

Abetti, together with astronomers Alessandro Dorna and Pietro Tacchini, participated in the expedition to India to observe the transit of Venus across the solar disk. He was responsible for building a small instrument called the "piccolo meridiano", a small meridian telescope mounted so that it rotated around an East-West axis. He also resumed the publication of articles that later became "Osservazioni e Memorie" (the first issue of the "Memorie dell'Osservatorio di Firenze ad Arcetri" was published in 1873 by G.B. Donati and was entirely dedicated to the aurora borealis of February 1872).

But above all it was Giorgio Abetti, following his father as Director of the Observatory in 1921, who gave an



Printed version  
and handwritten  
manuscript  
of the first issue  
of “Pubblicazioni  
dell’Osservatorio  
di Arcetri” 1893

international character to scientific research at the Arcetri Observatory. In 1913 he participated as astronomer and geophysicist in the geo-astronomical expedition led by Filippo De Filippi to Karakorum.

In 1908, Giorgio Abetti made his first trip to the United States where he met George Ellery Hale, who became a fundamental figure in Abetti’s scientific education. The two scientists established a close and fruitful collaboration that led to the construction of a solar tower 25 meters high at Arcetri, modelled on the one of Mount Wilson (California). Arcetri’s Solar Tower, one of the first in Europe, was inaugurated on the 22<sup>nd</sup> of June 1925 and was used almost continuously until 1972. More than twelve thousand solar images testify to the fruitful activity of Abetti and his assistants.

With Giorgio Abetti, a real Florentine “school” was born: Attilio Colacevich, Guglielmo Righini, Mario Girolamo Fracastoro and Margherita Hack were among his pupils and, starting from the 1930’s, Arcetri’s scientific activity had expanded rapidly especially in the field of solar physics. In 1929 Abetti was nominated to prepare a review for the *Handbuch der Physik*, an editorial initiative that

Participants  
of the De Filippi  
expedition,  
1913-1914



marked the state of the art of international astrophysical research. He was responsible for the section dedicated to solar physics. As a consequence, Abetti's international role in this particular field of astrophysics was consolidated.

Giorgio Abetti was involved in the construction of a national observatory that should have been (in the third centenary of Galileo's death) a symbol of the friendship between Italy and Germany. Mussolini wanted to build an observatory on the Albani hills, at Tuscolo near Rome, which would have involved equipment of German construction. In 1941, on the death of Emilio Bianchi, director of the Observatory of Merate and a leader of Italian astronomy in that period, Giorgio Abetti became the supervisor of the organization and construction. In the end, the project was not completed, but scientific activity at Arcetri after the war began with renewed vigor. Abetti organized and participated in scientific expeditions to observe eclipses: in 1936 at Sara (Siberia), in 1947 (Brasil), and in 1952 (Sudan). In 1952, the year of the expedition to Sudan for the total solar eclipse, Giorgio Abetti managed to obtain the hosting in Rome the VIII assembly of the International Astronomical Union, 30

years after the previous assembly. In the same year he left teaching and the direction of the Observatory.

Guglielmo Righini succeeded Abetti as Observatory Director and, from 1953 until his death in 1978, he studied new methods of observing the solar corona, introducing new complex radioastronomy technologies he had studied in Cambridge. Righini also organized observing campaigns using aeroplanes, artificially extending the totality time of solar eclipses, flying in the cone of the shadow of the moon. Guglielmo Righini did not hesitate to involve the Arcetri Observatory in the European Project JOSO (Joint Organization for Solar Observations) whose objective was to identify new sites of particular astronomical interest in order to establish new solar observatories. He also joined the international campaign to coordinate solar observations in order to create a network to monitor the sun over 24 hours a day.

In 1978 Franco Pacini became Director of the Observatory: he yet again broadened the scientific interests of the Observatory, both in the field of research and in advanced astrophysical technology, giving Arcetri a primary role in an international context.



Air mission to observe the eclipse of 1961 (photo Locchi Firenze)



Today, the Observatory is part of the National Institute for Astrophysics-INAf with headquarters in Rome. The institute was created in 2001, as a result of the merging of all the Italian Observatories with the goal of providing a strong, central institution to support the development of large-scale astronomical projects. In 2003, the institutional framework was changed again, with the inclusion into INAF of the Institutes of the National Research Council (CNR). This change became effective January 1, 2005 and now INAF consists of 15 research structures (12 Observatories and 3 Institutes) for a total of about 1000 employees.

At present, the scientific activity of the Arcetri Observatory is focused on different fields of astrophysics: star formation, extragalactic astronomy, solar physics, high energy astrophysics. The Arcetri Astrophysical Observatory, in collaboration with American and German research groups, projected and built in Arizona the largest binocular telescope (LBT) of the Northern hemisphere. Arcetri is also part of an international project (ALMA) whose main goal is the construction of a system of radiotelescopes in the Atacama desert (Chile) at the height of 5000 metres. In 2001 Marco Salvati succeeded F. Pacini in the direction until 2005.

At the moment the Director of the Arcetri Astrophysical Observatory is Dott. Francesco Palla.

---

## THE ARCHIVE

---

The history of the Observatory Archive is quite recent. In 1958, the Director, Giuglielmo Righini, deposited antique books, documents and instruments with the Institute and Museum of the History of Science in Florence, convinced that a research institute did not have adequate facilities for their conservation.

During the 1990's the Observatory Library underwent reconstruction and it was during this period that documents concerning the history of the Observatory emerged. It was decided to protect and preserve these documents, since they constituted an important part of the history of the Observatory. Thirty one items were discovered, regarding the work carried out by Antonio and Giorgio Abetti. Later, in other parts of the Observatory, accounts concerning the Observatory administration were found.

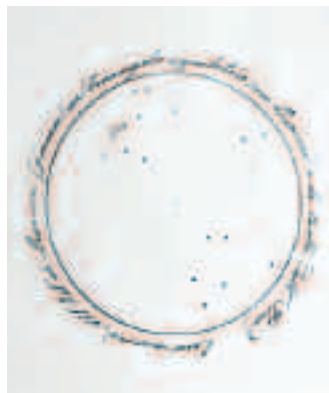
In 1998, a National project called "Specola 2000", promoted by the Ministero dei Beni Culturali and the Società Astronomica Italiana (SAIt), marked the beginning of the reorganization of the Archive. The Sovrintendenza Archivistica della Toscana inspected the locations and assessed the situation in order to evaluate the significance of the documents. Their remarkable historical interest was immediately apparent, thus prompting the reordering of the Archive.

In 2003, thanks to the collaboration of the Institute and Museum of the History of Science, many other documents concerning the Observatory were recovered and later conserved in the Observatory Archive.

In 2006, documents and letters concerning Giovan Battista Donati were purchased from an American antiquarian through contributions from the Library and Archive Service of the National Institute of Astrophysics (INAF). Another important part of the Archive - log books, astronomical observations, and photographs-deposited in the photographic laboratory, are still to be fully studied.

Documents and letters left by Professor Guglielmo Righini, the Observatory

A register of observations attributed to G.B. Donati, particular.



The De Filippi  
expedition,  
1913-1914



Director from 1953 to 1978, and by Giovanni Godoli, Professor of Astronomy in Florence and also Director of the Observatory of Catania from 1967 to 1976, have recently become part of the holdings of the Arcetri Archive.

---

#### THE MAIN SERIES

---

Even though reorganization is still in progress, the main sections of the Archive have already been identified. There are administrative documents and accounts, together with material concerning the institutional activity of the Observatory and the scientific research of the astronomers.

The administrative and account documents are few in number, and refer only to the recent history of the Observatory. They include deliberations by the Board of Directors, letters to the Ministry of Education, and administrative records covering the first half of the twentieth century. Two beautiful eighteenth century drawings are part of the collection, one of the unrealised construction project of the observatory in the Boboli Gardens and the other of Arcetri Observatory. There are also detailed plans for the construction of the Solar Tower, which was completed in 1925.

There are many interesting documents concerning the Library including inventory registers dating from 1872. A folder was found with correspondence between Italian and foreign Libraries for scientific information and publications during the period 1933-1952.

A very interesting curiosity is a series of registers dating from 1918 to 1966 which hold the signatures of all the visitors who climbed the hill to Arcetri. From these registers one can see that Arcetri has always been available to the public, attracting people from all walks of life.

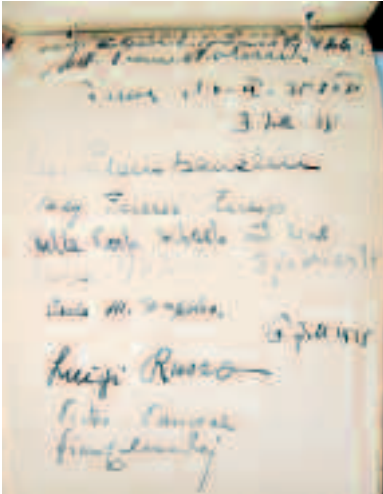
All kinds of visitors, not only astronomers, came from all corners of the world, including Europe, North and South America, Africa, China and Japan.

Among the documents that testify to the Observatory's scientific activity, there are calculations for the Calendar, starting from 1895, together with manuscripts of the first forty issues of the publication which was later entitled "Osservazioni e Memorie". There is also abundant documentation on eclipses and comets, and the vast number of solar observations made with the Arcetri Solar Tower since 1925.

An important section of the Archive is dedicated to the scientific expeditions. In fact there is a detailed description of the scientific expedition to the Karakorum mountains carried out by Filippo De Filippi between 1913 and 1914. Giorgio Abetti, then a young astronomer, took part in the expedition. Preparatory correspondence, maps and letters and photographs of this mission are all conserved in the



F. Nuti, "Progetto del nuovo Osservatorio astronomico da erigersi al Cavaliere del Reale Giardino di Boboli", s.d. [XIX century])



Visitors book,  
February 1938.  
Among the many  
signatures are those  
of Luigi Russo,  
Pietro Pancrazi  
e Piero Calamandrei

---

#### THE ASTRONOMER ARCHIVES

---

Like many observatories, close to the institutional documents, the Directors' papers, documents, letters etc. up until the age of retirement, are conserved as well as documents concerning astronomers who were part of or had collaborated with the Observatory. Correspondence makes up most of these documents; epistolary exchange had a fundamental role in the circulation of scientific information in an age when the publication of scientific reviews and the international meetings were much more difficult than today.

The most relevant of these personal Archives are the following:

*Giovan Battista Donati (1826-1873)* - Donati became part of the Astronomical and Meteorological Observatory of the Regio Museo di Fisica e Scienze Naturali di Firenze in the year 1854 and became Director in 1859. As mentioned before, he was instrumental in the construction of the new Observatory which was inaugurated in October

Archive. Documentation can also be found of the expedition to Sudan for the solar eclipse of February 1952.

Finally, there are two special sections of material that refer to the period in which Giorgio Abetti was Director of the Observatory: papers concerning the National Astronomical Committee, of which Abetti was secretary for many years, and drafts referring to the construction of a new national observatory to be built at Tuscolo near Rome.



Papers concerning Donati regarding the aurora borealis of 1872, on which occasion the astronomer collected information from all over the world

1872. His correspondence contains scientific collaborations, administrative documents and many papers concerning his work, particularly manuscripts describing observations of eclipses and comets starting from about 1857.

*Ernst W. Tempel (1821-1889)* - Self-taught, Tempel began his career as an amateur astronomer. Subsequently, he became assistant at the Observatory of Marseilles and at the Observatory of Brera. On the death of Donati, he was nominated the Director of Arcetri and remained so until his death. In 1885, after visiting him at the Observatory, the philosopher Friedrich Nietzsche described him as a “white-haired old gentleman”. Besides his astronomical calculations Tempel is also known for his splendid drawings of astronomical observations (owned by the Arcetri Observatory), some of which have become famous lithographs.

*Antonio Abetti (1846-1928)* - After completion of his Engineering degree at the University of Padova in 1867, in 1893 Abetti won the chair for astronomy in the *Regio Istituto di Studi Superiori Pratici e di Perfezionamento di Firenze*. In 1894 Abetti was nominated Director of the Observatory of Arcetri, a position that he held until 1921.

Letters addressed to Antonio Abetti on the occasion of his nomination to Director of the Arcetri Observatory, 1894



During his long career he studied classical astronomy, geodetic astronomy, and physical astronomy. He was a member of the Accademia dei Lincei and of many other national and international associations. The Archive contains his work notes, handwritten manuscripts and drafts of publications. But above all, it records his intense correspondence with Italian and foreign colleagues.

*Bortolo Viaro (1882-1922)* - After his degree in Mathematics at the University of Padova in 1893, Viaro became a colleague and friend of Antonio Abetti. His stay in Arcetri was a few years before the outbreak of World War I. The Archive contains a few of his work notes and many observations.

*Giorgio Abetti (1882-1982)* - After his degree in Physics at the University of Padova in 1904, Abetti lived in Germany and the United States where he established strong relationships in the scientific world. He succeeded his father as Director of the Arcetri Observatory and was responsible for the construction of the Solar Tower, inaugurated in 1925. He became President of the Istituto Nazionale di Ottica and member of the Accademia dei

Lincei. In addition to his role as scientist and teacher, he is remembered for his role in the communication of astronomy. Although after 1952, he was no longer Director of the Observatory, he remained active in his field for many years and documents concerning his work can be found up until 1979. His Archive is the largest and contains many letters and preparatory work regarding his publications. He had an intense correspondence with George Hale, Emilio Bianchi and many other Italian and foreign scientists. Substantial material, illustrating the organization of the meetings, concerns the International Astronomical Union of which Giorgio Abetti was Vice President.

*Pietro Tacchini (1838-1905)* - There are drafts of 20 manuscripts and approximately 200 letters that Father Angelo Secchi S.J. wrote to Pietro Tacchini in the period 1865-1877. These documents were donated to the Arcetri Observatory in 1938 by Pietro Tacchini's nephew (as noted in a letter written to Giorgio Abetti). The letters sent by Tacchini to Secchi are conserved at the Pontificia Università Gregoriana di Roma.

*Giuseppe Lorenzoni (1834-1914)* - After a degree in Engineering in 1864, Lorenzoni later became the Director of the Padova Observatory from 1878 to 1912. We do not know how papers concerning him arrived in Arcetri but they are probably related to an old friendship between the Abetti and Lorenzoni families. There are still many letters concerning Lorenzoni that are yet to be classified.

*Where not indicated the photographs belong to the Arcetri Astrophysical Observatory*

Finito di stampare in Firenze  
presso la tipografia editrice Polistampa  
giugno 2008