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STARDUST: PRESERVING AND SHARING THE ITALIAN ASTRONOMICAL HERITAGE

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Abstract. *The cultural heritage of the National Institute for Astrophysics (INAF) consists of about 7000 rare books, over three millions archival documents, and over a thousand pieces of scientific instruments. These collections mark the milestones in the history of astronomy in Italy. In order to valorize the historical heritage to the largest audiences, INAF has realized “Polvere di Stelle” (Stardust), a web portal dedicated to the Italian astronomical libraries, archives and museums. It offers tools and databases to support astronomical research and increase the knowledge of one of the richest astronomical heritage in the world. In a single virtual place one can find useful tools for sharing digital resources and services for current research. In addition to the consultation of the bibliographic data of ancient and modern books and serials, the portal allows researchers and general public to search at the same time other databases: manuscripts, instruments, archival documents, and biographies of astronomers. Furthermore, a digital showcase of rare books plays a relevant role in the portal.*

This paper illustrates the ongoing developments and perspectives of Polvere di stelle.

Keywords: *Astronomical Heritage, Preservation, Digital Infrastructure.*

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Italian Astronomical legacy

The National Institute for Astrophysics (INAF) is the Italian research institute, whose mission is to execute and promote scientific research in astronomy and astrophysics considering earth- and space-based activities, and also to develop innovative technologies and advanced instrumentation to explore the cosmos. Moreover, INAF has the duty to disseminate and popularize its scientific results and knowledge both in school and society and to promote and encourage technological transfer towards industries. INAF maintains a close scientific collaboration with Universities and other bodies performing astronomical research in Italy and abroad, such as National Institute for Nuclear Physics (INFN), Italian Space Agency (ASI), European Southern Observatory (ESO), European Space Agency (ESA), and National Aeronautics and Space Administration (NASA). The Institute was founded in 1999 and today has seventeen research units, sixteen in Italy spread in twelve cities: Bologna, Catania, Cagliari, Florence, Milan, Naples, Padua, Palermo, Rome, Teramo, Trieste and Turin, and one in Spain at Canary Islands.

Most of the INAF departments are constituted by the twelve Italian astronomical Observatories, which are the oldest scientific institutions in the country, and more in general in the world. The Observatories of Brera (in Milan) (Fig. 1), Padua, Turin, and Palermo were established in the second half of XVIII century, following the first two founded in Bologna and in Pisa. The observatory of Bologna was established by the scientist Luigi Ferdinando Marsigli (1658–1730), pupil of Geminiano Montanari (1633–1687) and Marcello Malpighi (1628–1694), in 1712 in a tower on the top of “Palazzo Poggi” [1]. For more than three centuries this building was also the headquarter of Bologna University, and nowadays hosts the university museum collections, including the astronomical museum, while the Observatory has a modern location on the Bologna scientific campus. The Observatory of Pisa was established in 1734 following the idea and project of Bologna. Due to the unsteadiness of the ground, the tower showed stability problems and was demolished in 1826. The Observatory was definitively abolished in 1833, and now the building houses the Domus Galileana [2].



Fig. 1. The Specola of Brera designed by Stefano Calvi, and engraved by Domenico Cagnoni, 1788. (Milan)

The Observatory of Milan, founded between 1762 and 1764 by Louis Lagrange (1711–1783) and Roger Boscovich (1711–1787) in the Brera Palace, is the oldest astronomical institution operating in Italy, which preserves its historical heritage [3; 4]. In the same years the Venetian Senate established an Observatory in Padua, under the direction of Giuseppe Toaldo (1719–1797),

in the main tower of the medieval castle of the Carraresi family, used by Ezzellino III da Romano as prison in the XIII century [5]. In Turin the Observatory was established in 1790 on the top of Collegio dei Nobili Palace, headquarters of the Science Academy. In 1822 the Observatory was moved on “Palazzo Madama”, and in 1912 a new building was realized on the top of the Pino Torinese hill, a town near Turin [6]. In 1791 Giuseppe Piazzi (1746–1826) founded the Observatory of Palermo in the highest tower of the Royal Palace, seat of the Kings of Sicily during the Norman domination. From up there Piazzi discovered Ceres, the first dwarf planet, in the night of 1st January 1801 [7].

The Observatory of Naples was established formally in January 1807 and hosted in an old monastery. In November 1812 the foundation stone of the observatory of Capodimonte was laid, the first building in Italy conceived for scientific purposes [8; 9]. In Rome there were two Observatories at the Collegio Romano and Campidoglio. The first one was established by the Pope Clemens XIV in 1774, and operated by Jesuit astronomers; the second one was founded in 1827 on the tower of Campidoglio. After the unification of Italy, the two observatories became the Vatican Observatory and the Rome Observatory, respectively. In the 1930s the Observatory of Rome was moved in the ancient Villa Mellini on Monte Mario. Here the precious and rare collection of astronomical instruments, donated by the Polish historian Artur Wołyński (1844–1893) to Italy, was settled [10]. Furthermore, a new building was constructed in Monte Porzio Catone, a town 60 km far from Rome, where the Observatory of Rome is now located [11]. On the top of the Arcetri hill, close to the “Villa il Gioiello”, the last residence of Galileo Galilei, in 1869 was founded the Observatory of Florence by Giovan Battista Donati (1826–1873), famous for the discovery of five comets, including that of 1858, the most brilliant comet ever seen in XIX century [12]. In Sicily, the astronomer Pietro Tacchini (1838–1905) founded the Observatory on the Etna volcano in 1876, intended for the astrophysical observations, and in 1880 the Catania University established the first chair in astrophysics in Italy [13]. In the small town of Teramo, in central Italy, Vincenzo Cerulli (1859–1927) built a private observatory named “Collurania” (Urania hill) in 1893. He donated it to Italian government in 1917 [14]. On the Carloforte island, off the south west coast of Sardinia, an observation station was established in 1899 as one of the stations of the International Latitude Service. It became Observatory in 1911 [15]. And finally, the Observatory of Trieste, a city in the far north-east of Italy which was part of Habsburg Empire until the end of the Great War, was established in 1851 for meteorological observations on the turret of the old “Palazzo Basevi”. It was transformed in astronomical observatory after the city passed to Italy [16]. This quick historical excursus among the Italian Observatories shows the great cultural wealth, in addition to the scientific one, that INAF research units testify with their buildings, libraries, archives and museums.

The cultural heritage

The historical and scientific heritage of INAF, consisting of books, archival documents and instruments, testifies the development of astronomy in Italy from pre-Galilean observations to present. The INAF bibliographic heritage held in its libraries consists of about 7000 rare books published from 1470 to 1830, including 30 manuscripts, some dating back to the early XIV century, 19 incunabula and 551 sixteenth-century editions. Each collection has peculiar aspects due to the history of its Observatory. In the case of Brera, for example, the first volumes came from the exceptionally fine library of the Brera Jesuit College, to which the observatory was annexed. In Palermo, instead, the library originated from the legacy of the Observatory's first director, Giuseppe Piazzi, who donated his own personal collection of books and papers. In Naples the library of the Capodimonte Observatory was started by Federico Zuccari (1783–1817) in the years 1812–1815, while the observatory was being built, and was later enriched by private donations. In Padua, the original collection of books dating back to the foundation of the Observatory was greatly enriched in 1873 by a donation of Giovanni Santini (1787–1877), the third director. In all cases, however, the libraries have gradually been enriched with the acquisitions necessary for the increasing scientific activities carried out by astronomers.

Most of the subjects of the books are astronomy and physics, although there are texts from various scientific and literary disciplines related to astronomy, such as meteorology, mathematics, geography and even literature and philosophy. Some precious volumes owned in the INAF libraries represent true cultural milestones. The works of Galilei, Copernicus, Ptolemy, Kepler and Newton, considered the *banners* of the scientific revolution, paved the way for modern science. A lot of these volumes are often valuable first print editions. For examples, the library of Capodimonte Observatory has two copies of “De Revolutionibus orbium coelestium” by Copernicus, the first edition published in 1543 and the second one published in 1566. The oldest one has handmade corrections imposed by the Holy Inquisition in 1616, after the sentence which obliged Galilei to abjure (Fig. 2).

These books are interesting for their contribution to the development of Western culture, as well as for the magnificent engravings and illustrations they present. Between the second half of the XVI century and the beginning of the XVII, illustrated scientific books spread throughout Europe. Furthermore, since Galilei started the astronomical observations with his “Perspicillum” (the Latin name used by Galilei for the telescope) in the autumn of 1609, the cosmos revealed scientists a lot of celestial details. Astronomers and engravers represented the new planets, the new stars, the solar maculae, and the craters of the Moon with painstaking care in some precious volumes of rare beauty, merging art, mythology and science. Pre-

cious masterpieces are the wonderful star atlases, such as the “Uranometria” (1661) of Johann Bayer, the “Prodomus astronomiae” (1690) of Johannes Hevelius, the “Atlas coelestis” (1742) of Johann Gabriel Dopplmayer, and the “Atlas coelestis” (1753) of John Flamsteed. Moreover, there are the cometographies and selenographies of the Northern Europe astronomers, as well as the meticulous representations of the scientific instruments, such as the “Astronomiae instauratae mechanica” (1602) of Tycho Brahe, and “De astronomica specula domestica” (1745) of Giovanni Giacomo Marinoni.

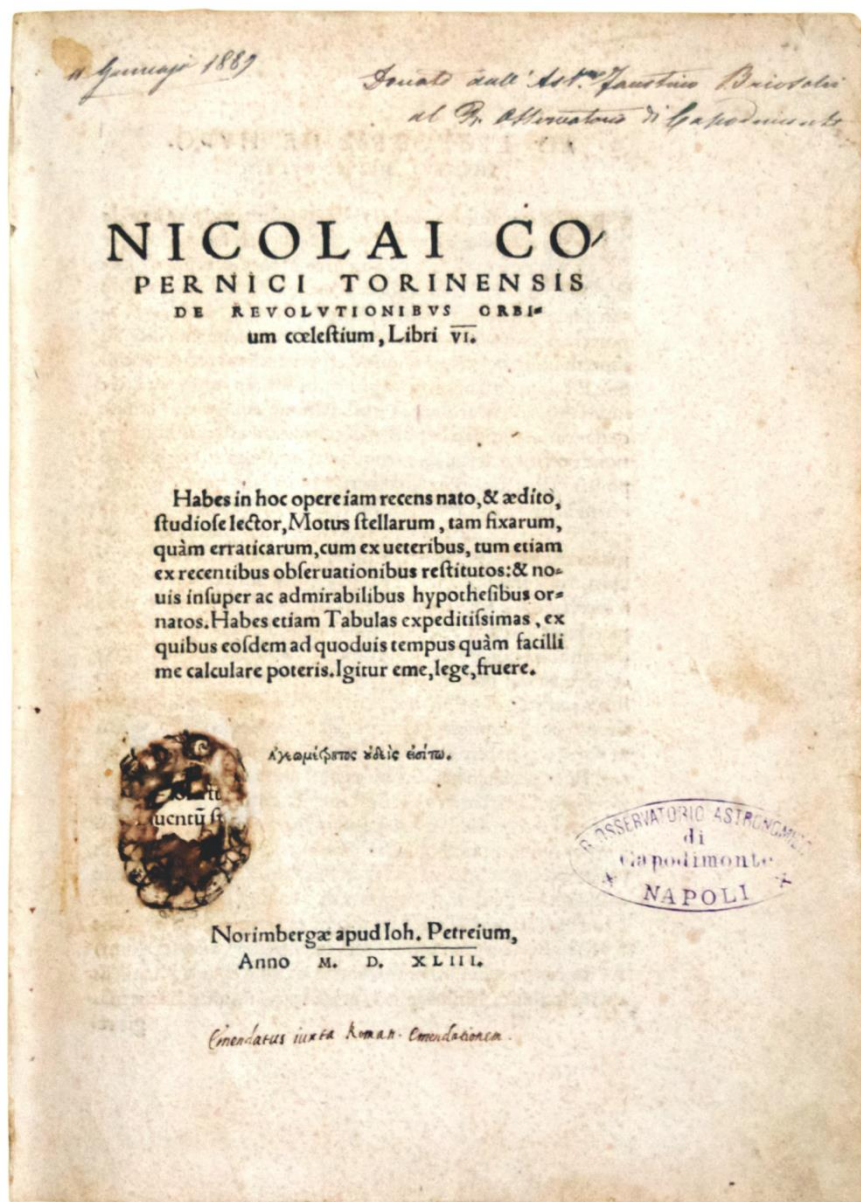


Fig. 2. *Revolutionibus orbium coelestium* by Copernicus, 1543. At the bottom of the page the handwritten note of the Holy Inquisition. (Naples)

While libraries were and still are working tools for the astronomers, historical archives served a different purpose.

The archives of the astronomical observatories consist of records providing written evidences of the scientific activities carried out by each institution. They originated from the natural accumulation of documents produced or received by astronomers. The astronomer's daily activity logs show how the Observatories created and archived documents, mainly handwritten administrative and scientific materials. They include records from countless nights spent at the telescope, beautiful sketches of nebulae, comets and planets, made during the night observations under the dome, letters revealing the mind paths leading to extraordinary scientific discoveries, journey logbooks, meteorological observations as a continuum line throughout the centuries, settled bills, book receipts, reports from journeys, maps, drawings (Fig. 3).

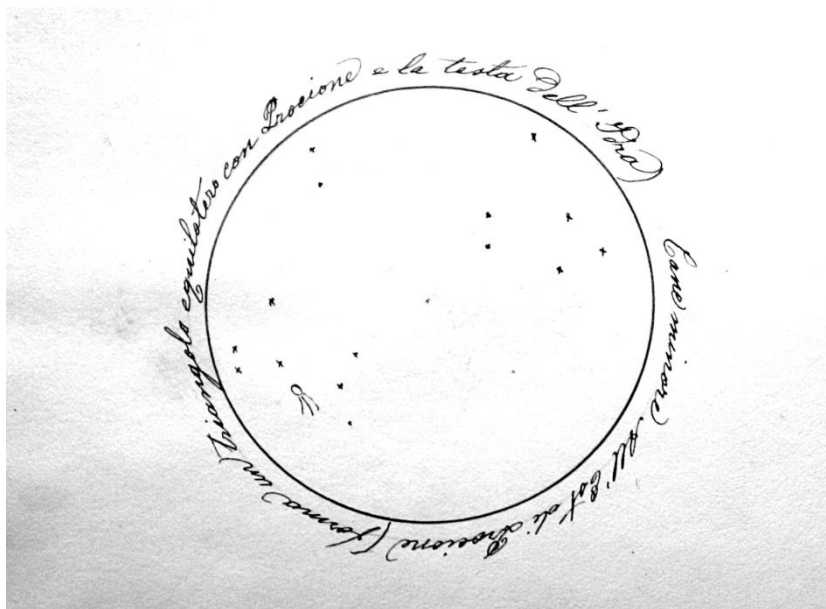


Fig. 3. Sketch of a comet in the Canis Minor constellation attributed to G.B. Donati, 1860ca. (Florence)

Due to the role played by astronomers in past centuries, the archival materials preserved in the Observatories are a source of primary importance both for studies in the history of science and for research in a wide variety of thematic areas that had crucial outcomes in the civil and political life of their time. For example, the astronomical archives preserve documents related to the construction of the great sundials in the cathedrals of Palermo, Milan and Bologna; the compilation of ephemeris for nautical almanacs; correspondence with engineers for drawing up detailed maps, and for regulating public clocks; collaborations with the judicial authorities. A cultural legacy consists of over three million documents, including 122 series of archival fonds of the Italian astronomers [17].

The development of the cosmic sciences and the contribution to the progress of astronomy, made by Italian astronomers over the centuries, are amply testified by the historical instruments preserved in the astronomical Observatories. The entire collection of INAF includes a total of over a thousand pieces: quadrants, sextants, telescopes, theodolites, clocks, stopwatches, globes, mathematical and surveying instruments, thermometers, barometers, hygrometers and meteorological instrumentation, ranging from the sixteenth century to the first half of 1900s.

Any museum collection, disseminated in the INAF institutes, was formed by collecting observatory equipment, purchased or built by specialized mechanics, used in the past by astronomers for their scientific research, both astronomical and meteorological, both magnetic and geodetic. The exception is the Astronomical and Copernican Museum in Rome that has a different story for its establishment. It was founded in 1873, during the celebrations of the 400th anniversary of the birth of Copernicus, thanks to the precious donation made by Artur Wołyński. This collection includes Copernican memorabilia and other legacies of high scientific and cultural value. In the other Observatories, such as Capodimonte, the original collection has been enlarged and enriched with the acquisition of other precious scientific and artistic objects.

Among all the pieces preserved and exhibited in the INAF museums there are: the Arabic astrolabe (1096), manufactured in Spain and one of the oldest astrolabes in the world (Fig. 4), the celestial globe (1589) made in German by Roll and Reinhold, the mural quadrant of Ramsden (1776) (Fig. 5) with which Toaldo measured double stars in the Cygnus constellation, the Ramsden Circle (1787ca.), used by Giuseppe Piazzi to discover Ceres in 1801, the equatorial telescope of Fraunhofer (1814), the largest telescope made in the first two decades of XIX century, the achromatic lens of Amici (1840), employed by Donati to discover the great comet of 1858, the spectroscope of Hofmann (1862), used by Secchi for the first spectroscopic stellar classification, the dome and the telescope of Merz (1863ca.) exploited by Giovanni Virginio Schiaparelli to realize the first cartography of Mars.



Fig. 4. Arabic astrolabe, 1096. (Rome)

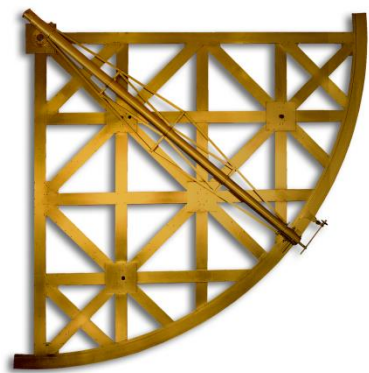


Fig. 5. Mural quadrant by Jesse Ramsden, 1776. (Padua)

The astronomical instruments are objects representing both the research carried out by the Italian astronomers for the development of astronomical sciences in the past centuries, and the expertise endowed by the mechanics and technicians who built them. In this sense, each object is unique in the history of the construction of scientific instruments.

The project “Polvere di Stelle”

In order to valorize and share the historical heritage of Italian astronomy to the largest audiences, including scientists, historians, students, and general public, INAF has realized “Polvere di Stelle” (Stardust), the web portal of the Italian astronomical cultural heritage. The project was conceived in 2009 for the International Year of Astronomy. It originated from the growing interest in historical archives that has engaged the archivists and librarians of Italian observatories in the last 30 years. The first release of “Polvere di Stelle” can also be considered a final result of the “Specola 2000” project. It was an Italian project supported by the Ministry of Cultural Heritage, started in 1999 with the aim of reordering and inventing the historical archives of all Italian astronomical observatories [18].

The project has increased the knowledge of the historical legacy of Italian astronomy,, presenting in a complete and homogeneous way the treasures hidden in the folders of the Italian astronomical archives. The idea underlying “Polvere di Stelle” was to offer a *stargate* to access twelve historical archives, to consult a first group of archival data recorded in a professional database, and to browse a large gallery of the most important documents. In addition, an elegant booklet and a video were published to present archival series and documents, and to show the Stardust pearls held by the historical archives of Italian Observatories.

The project had a turning point in 2013, when INAF decided to create a web platform to host all the cultural heritage of the astronomical observatories in Italy. The experiences acquired in the previous years with initiatives for the preservation and enhancement of the INAF collections of li-

braries, archives and museums raised the awareness of its uniqueness in the panorama of Italian cultural heritage. The main goal of this platform is to make all these sources accessible in a wide and articulate way, presenting a wealth of useful tools both for studies and for teaching ancient and modern astronomy. At the same time the portal wants to offer information for the dissemination of scientific culture and for the preservation of historical memory on Italian astronomy.

Furthermore, the use of this new digital platform has allowed INAF to adopt a single tool for cataloging its historical and cultural heritage based on national and international standards. Thus was born the new “Polvere di Stelle, the cultural heritage of Italian astronomy” (www.beniculturali.inaf.it). This digital platform uses two databases to record the cultural heritage. A third one is used to manage the web portal.

Bibliowin is the web-based interface to catalogue books and journals, both modern and old, in accordance with the International Standards. The application program allows the shared and derived cataloguing, and is provided with tools for library circulation and management.

SicapWeb is the web interface of a database that includes six cataloguing modules for different kinds of historical holdings. The module for manuscripts follows the standards approved by the Standing Committees of the IFLA Section on Cataloguing and the IFLA Section on Rare Books and Manuscripts. The inventory module for the archival documents complies with the ISAD (G), General International Standard Archival Description, and ISAAR (CPF), International Standard Archival Authority Record for Corporate Bodies, Persons and Families. The modules for the scientific and technological instruments, the art-works, the astronomical plates and photographs are defined in accordance with the rules of the Italian Minister of Culture. Finally, the last module is structured to record the biographies of Italian astronomers.

A new release of the web portal was published in 2014 and presented in Naples at the LISA conference, the international congress for Library Information and Services in Astronomy [19]. In 2018 the last version of “Polvere di Stelle” was released [20]. Within the portal, three complementary sections present libraries, archives, and instrument collections of INAF astronomical Observatories. Besides being the oldest scientific institutes in Italy, the Observatories had also a cultural leadership at large. Many of them were installed in antique buildings, such as the medieval tower in Padua, the royal Norman Palace in Palermo or the Brera Palace in Milan. Therefore, the Italian Observatories preserve also some valuable artworks as frescoes, sculptures, paintings and honor medals. A catalogue of these kinds of objects has yet to be completed but, right now, some hundred pieces of art can be roughly counted at a first estimate. For what

concerns astronomical plates and photographs, the Italian observatories own solar and lunar eclipses photos, such as the plates realized by Angelo Secchi (1818–1878), father of astrophysics, during some astronomical expeditions to observe solar eclipse phenomena, and images of historical and social events, like the pictures of the first general assembly of the International Astronomical Union held in Rome in 1922. So far, two collections of drawings and plates of solar observations have been recorded and scanned. “Polvere di Stelle” presents 2516 sketches of the Sun realized from 1865 to 1925 at the Catania Observatory (Fig. 6), and the 5250 CaIIK and 6941 H α spectroheliograms acquired at the Arcetri solar tower from 1926 to 1974. In next future these records and their digital copies will be uploaded in *SicapWeb*.

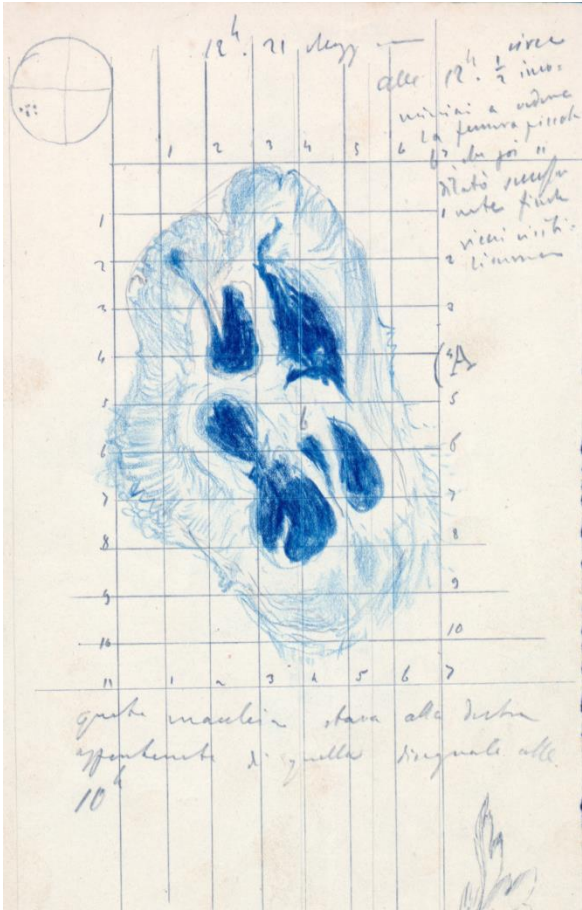


Fig. 6. Drawing of a Sunspot by Pietro Tacchini, 21 May 1865. (Catania)

In 1997 the Italian Astronomical Society published a book with 277 short biography records of Italian astronomers from the Unity (1861) to the present [21]. The astronomers who worked in the Italian observatories were clearly many more, so the next goal will be adding the biographic profiles of Italian astronomers in *SicapWeb*.

The structure of Stardust

The contents and the services offered by “Polvere di Stelle” are available to every user: astronomers, students, historical researchers, amateurs. A general introduction presents the three different thematic areas constituting the web platform. The web pages of each historical and cultural area of each Italian Observatory describe the ongoing activities and projects, offer access to catalogues and tools, and provide tips for a wide variety of users. The actual structure of the portal is the result of a long-time cooperation among Italian astronomical observatories in the library, archives and museum areas (7).



Fig. 7. Polvere di Stelle (Stardust) homepage

The web portal presents the following.

13 LIBRARIES

Twelve in the astronomical Observatories and one at the Fundación Galileo Galilei, which operates the TNG (Telescopio Nazionale Galilei) at Los Roches de los Muchachos in La Palma island. Each single library section presents the institute, staff, opening hours, local services, rules, and historical notes.

12 HISTORICAL ARCHIVES

Eleven in the Observatories and one is owned by the Department of Physics and Astronomy of Bologna University. Besides information on staff and schedules, every archive describes how it was formed, its structure, and the sorting and inventory status of documents. Moreover, the complete tree structure of the archives is offered. In some cases, such as in Padua, Milan, and Turin, more than a single archive is kept and presented.

9 MUSEUMS

Six of them are museums actually formed. The others are astronomical collection integrated in the general outreach program of the Observatories. In addition to general information, some museums' web pages show peculiar aspects of exhibits such as historical notes, virtual tours, and detailed descriptions of domes or gardens.

What the digital platform offers

In addition to the sections dedicated to the presentation of the structures, "Polvere di Stelle" offers a double way to search the databases: a specific form to search books, archives, and museum collections, and a combined form allowing a query in the two databases and in all kinds of materials: books, archival documents, manuscripts, artworks, scientific instruments, photographs, and records of astronomers biographies (8).

Any record, shown on the web, presents both the descriptions of the item and some other information, such as historical and specimen notes, in addition to the biographical notices about authors, printers, astronomers who had to deal with the objects. In particular the records of the astronomers contain links for the queries on the INAF library catalogue, on the Astrophysics Data System (ADS), that is the digital library in astronomy and physics operated by the Smithsonian Astrophysical Observatory under a NASA grant, and on the different *Sicapweb* modules. Therefore, each record presents a complete bibliography and a list of the cultural materials related to each astronomer.

Moreover, the records relating to museum instruments and archival documents include one or more query functions that allow users to search the database for all the records with the same metadata, such as the institution that preserves the object, the people mentioned in the document, the categories, the authors, and the craftsmen. These useful interconnections permit both to shed new light on peculiar aspects of the history of astronomy, and to realize thematic pathways of important astronomical events, discoveries and instrument employments.

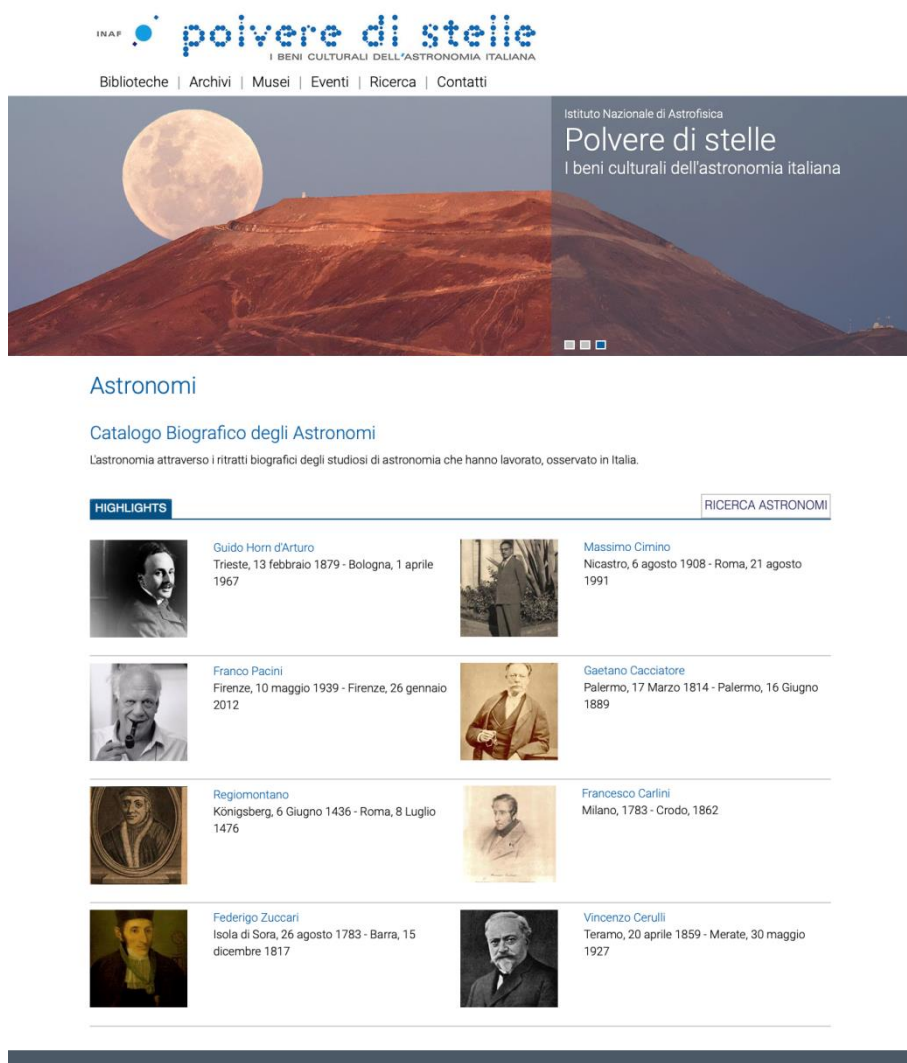


Fig. 8. Biographies of Italian Astronomers

“Polvere di Stelle” presents also a digital showcase that plays a relevant role on the web portal (9). With the same technology used to store and share astronomical data, the Italian data-center for Astronomical Archives (IA2) has set up a platform to create a national repository for the digital copies of ancient books and archives documents. IA2 is an INAF infrastructure hosted at the Trieste Observatory. Using the cloud paradigm, it hosts data from the main ground-based Italian Telescopes and offers data access through user portals and Virtual Observatory (VO) services. Referring to this infrastructure, over 115,000 files of about 450 ancient and historical books have been uploaded. Each page has been scanned with three different resolutions: the 150 DPI images are used for browsing the books on the web, while the 300 and 600 DPI images are stored for the digital preservation of each book. At present, the digital showcase enables users to leaf through the rarest and valuable editions of the ancient book collection in a

full color digital format and in a very good resolution [22]. The showcase presents some highlighted volumes and four tabs listing Stellar atlases, Incunabula, XVI century, and XVII century editions. Moreover, the timeline and the search areas allow users to surf and search all the available digital copies of INAF ancient books published between 1326 and 1830, as well as some other historical books and serials that arrive until 1984 [23].

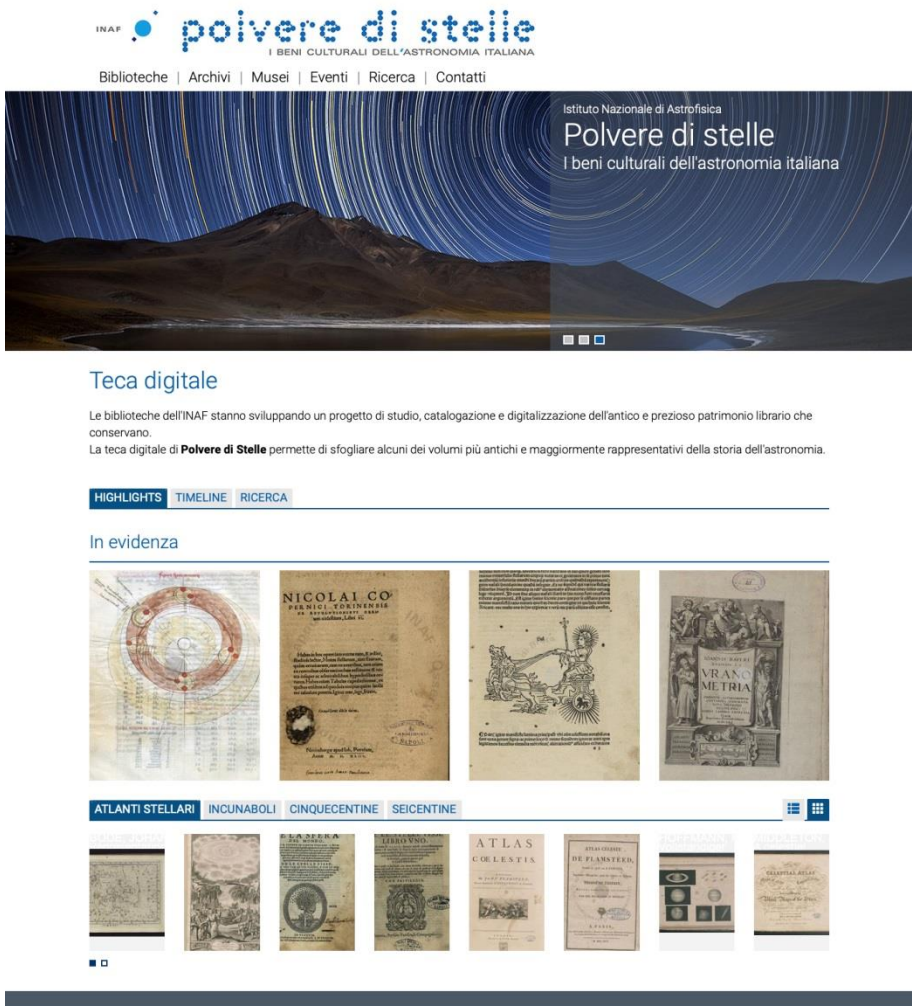


Fig. 9. Digital showcase of rare and valuable books

A policy has also been defined to upload archival documents into the national repository. Until now, the digitized documents of 145 archival records have been uploaded, such as the oldest meteorological records of the Padua Observatory, and the observations of sunspots and prominences made at the Catania Observatory. The project to digitalize more than 10.000 drawings of the solar observations made in Rome by Angelo Secchi will end in next few months. In addition, users can search and consult the database of the astronomical archives of Bologna University, and also see and download the digital copies of more than a half of the archives documents.

“Polvere di Stelle” is also a launch window to promote the activities and the events to valorize the cultural heritage and to disseminate the astronomical knowledge for the general public and schools, even in a multidisciplinary approach. A long series of cultural initiatives have been realized in the last years in the libraries, archives and museums of each Italian Observatory, such as: concerts organized in the library hall of Arcetri Observatory playing the “Einstein piano”, which was a gift of Albert Einstein to his sister Maja during her stay in Florence; the virtual exhibition to celebrate the Neapolitan astronomer, Federigo Zuccari, founder of the Capodimonte Observatory; the historical study to realize the virtual archive of correspondence of Annibale de Gasparis, the astronomer who discovered nine asteroids in Naples; and the theatrical performance “Settemillimetridiuniverso” (Sevenmillimetersouniverse), conceived for the historical project “Starlight: the birth of astrophysics in Italy”. Starlight was a shared exhibition realized in five observatories in 2016: Palermo, Naples, Rome, Florence and Padua (see the virtual tour at the address: www.starlight.inaf.it).

The plurality and variety of the events archived in “Polvere di Stelle” testify the work done. A special mention goes to a particular event that took place in January 2015. On the 70th anniversary from the liberation of Auschwitz concentration camp, some librarians, archivists, and historians of INAF organized the conference “Under the same sky?” to commemorate the six Jewish Italian astronomers Azeglio Bemporad (1875–1945), Giulio Bemporad (1888–1945), Luigi Jacchia (1910–1996), Guido Horn d’Arturo (1879–1967), Tullio Levi-Civita (1873–1941), and Bruno Rossi (1905–1993), who at the end of 1938 were dismissed from their offices because of the racial laws, issued by the Fascist Government to exclude the Italian Jews from all sectors of public and private life [24].

Finally, “Polvere di Stelle” offers a bibliography of Italian astronomical books for children, a selection of texts, updated periodically, aimed at teachers, parents, public librarians, and science communicators. This kind of bibliography is a unique tool ever made in the Italian scientific libraries.

Conclusions

“Polvere di Stelle” is a platform to support current research and, at the same time, a web portal to enhance the Italian astronomical heritage. An interlinked web tool that looks to the present and includes the past, in the name of the historical and scientific knowledge considered as a distinctive element of the astronomical Observatories in Italy.

After ten years since its first release, the staff of INAF, involved in the historical and cultural studies and activities, are now working to implement new contents, such as the “Tales of Astronomy”, a series of a short videos to tell peculiar historical and scientific events, to explain the use of astronomical instruments for scientific studies, to narrate the history of Italian observato-

ries, and to describe the protagonists of astronomy in past centuries (Fig. 10). The digitization of old books will also continue, and a new set of rare plates, and fundamental volumes concerning the development of astronomy will be soon available in the showcase.

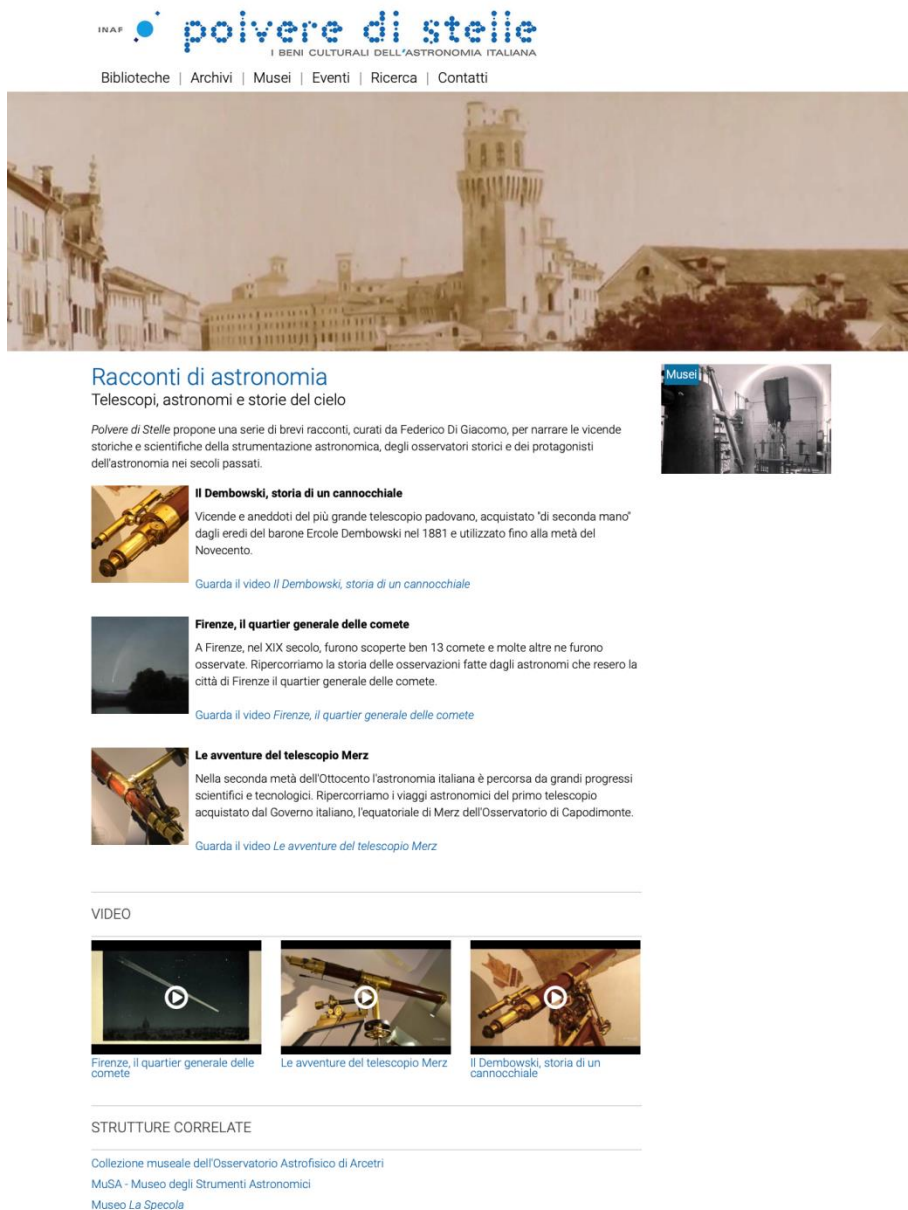


Fig. 10. The video column “Tales of Astronomy”

“Polvere di Stelle” is and will be even more a focal point supporting astronomical research with its information services, and preserving the great cultural heritage of astronomy which is “the most beautiful monument of the human mind” [25].

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«ЗВЕЗДНАЯ ПЫЛЬ»: СОХРАНЯЕМ И ДЕЛИМСЯ ИТАЛЬЯНСКИМ АСТРОНОМИЧЕСКИМ НАСЛЕДИЕМ

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Аннотация. Национальный институт астрофизики (INAF) имеет уникальную историю, так как в его составе находятся рассеянные по всей стране старейшие итальянские исследовательские центры – астрономические обсерватории. Основная миссия INAF – планирование и проведение исследований и изысканий в области астрономии и астрофизики как с земли, так и из космоса. Кроме того, INAF распространяет и популяризирует свои результаты и знания как в учебных заведениях, так и в обществе, а также сохраняет и пропагандирует свое историческое наследие. Культурное наследие INAF, состоящее из редких и современных книг, инструментов и архивных документов, занимает особое место в истории астрономии в Италии, начиная от догалилеевских наблюдений до наших дней. В собраниях хранится около 7000 редких книг, изданных с 1470 по 1830 год, более трех миллионов архивных документов, и более тысячи научных инструментов в диапазоне от астролябии 1096 г. до объектов первой половины 1900-х годов. Для валоризации и обмена всем историко-культурным наследием среди крупнейших аудиторий, включая ученых, историков, студентов и широкую общественность, Национальный институт астрофизики реализовал проект «Звездная пыль» (*Polvere di Stelle*), в рамках которого создан интернет-портал, посвященный итальянским астрономическим библиотекам, архивам и музеям. Он предлагает различные инструменты и базы данных, предназначенные для поддержки астрономических исследований и повышения ценности одного из богатейших астрономических наследий в мире. В одном виртуальном пространстве можно найти необходимые информационные ресурсы и методические разработки для проведения исследований. Помимо библиографических данных древних и современных книг и журналов, портал предлагает астрономам, ученым, студентам, астрономам-любителям и историкам науки возможность использовать одновременно и другие базы данных: по рукописям, инструментам, архивным документам и биографиям астрономов. Кроме того, значительное место на портале занимают оцифрованные редкие книги.

Ключевые слова: астрономическое наследие, сохранение наследия, цифровая инфраструктура.

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