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The AstroBID: Searching through the Italian Astronomical Heritage

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Abstract. The scientific heritage held in the National Institute for Astrophysics (INAF), made up of rare and modern books, instruments, and archival documents spanning from the 15th to the early 20th century, marks the milestones in the history of astronomy in Italy.

To promote this history of this historical collection, the Libraries and Historical Archives Service and the Museums Service of INAF have developed a project aimed at creating a single web portal: *Polvere di stelle. I beni culturali dell'astronomia italiana* (Stardust. The cultural heritage of the Italian astronomy). This portal searches for data coming from the libraries, the instruments collections and the historical archives, regarding the heritage of the Italian Observatories.

The BID (Books, Instruments, Documents) of the project is the creation of a multimedia web facility, which allows the public to make simultaneous searches on the three different types of materials.

1. The Cultural Mission of the National Institute for Astrophysics

The National Institute for Astrophysics (INAF) is made up of seventeen research centers spread all over the national country and distinguished by different histories. The oldest entities are the twelve observatories that merged with the new institution when the INAF was established in 2001. As part of its mission, INAF has the task of safeguarding, conserving, and making accessible this ancient scientific and historical heritage collected by the observatories through the coordinated efforts of all of the research centers.

The INAF historical and scientific holdings consists of rare and modern books, archival documents, and instruments which demonstrate the development of astronomy

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in Italy from the pre–Galilean period to the present. The Libraries and Archives Unit and the Museums Unit, both of which are part of the INAF Scientific Direction, carry out the management and preservation of this heritage. The principal aim of the two units is to make this heritage widely accessible to the largest number of people, ranging from scientists and historians to sky lovers and laymen.

2. Books

The astronomical library collections are closely linked with the origins and development of the activities of each respective observatory. These libraries have been enriched over time due to the increased scientific importance of the observatories. The INAF rare book collection consists of about seven thousand volumes and items are held in all the oldest Italian astronomical observatories, particularly in Brera (Milan), Naples, Padua, and Palermo.

This collection covers a time range from about 1300 to 1830, including important manuscripts, with the oldest material dating back to the early fourteenth century. The printed books are from 1470 to 1830.[1] The main subjects of these books are astronomy, physics, and mathematics. Disciplines connected to astronomy, such as meteorology, geography, and philosophy, are also well represented in the entire collection. The Italian observatories often hold the first editions of the works of Galileo, Copernicus, Ptolemy, Kepler, and Newton.

As a working tool in support of the modern astronomical research, the Libraries and Archives Unit acquired a new cataloging software in 2010, Bibliowin Web 5.0. This allowed all the INAF libraries to do shared cataloging via the web and to query the system through their own OPACs. With respect to the ancient book collection, not all observatories have made bibliographic data available for their holdings, and in some cases, this information is uncertain. In order to unify the data across the collection, there are three proposed phases.

1. Inventory the antique books by inspection all of the volumes;
2. Perform "book in hand" cataloguing of the entire historical collection using the Bibliowin Web 5.0 database[2];
3. Digitize the most fragile and valuable volumes in the INAF collection according to the standards recommended by the BDI (Italian Digital Library) (see Figure 1 and Figure 2).

At present only two observatories, the Astronomical Observatory of Capodimonte and the Astronomical Observatory of Rome, have carried out the cataloging of large part of their ancient book collection according to the SBN rules. The bibliographic

[1] According to the criteria established by the ICCU (Central Institute for the Union Catalogue), antique printed books are considered the ones published from the beginning of the discovery of the movable type printing, in 1453, up to 1830.

[2] As the software can capture records from the Italian SBN (National Library Service) catalogue, the descriptions match the SBN standard, with headings chosen according to the REICAT (Italian Cataloging Rules) rules.

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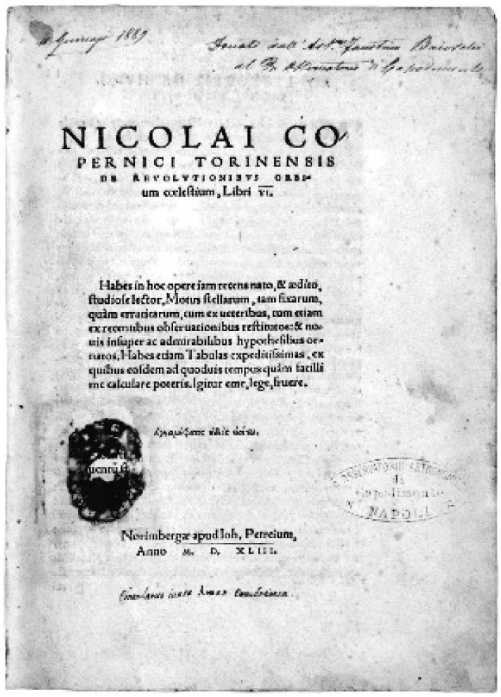

Figure 1. *Theorica planetarum* by Johannes de Sacrobosco (XIV century). A page from the most ancient manuscript owned by INAF

Figure 2. *De revolutionibus orbium coelestium* by N. Copernicus, first edition (1543) with the corrections imposed by the Inquisition

records will soon be available in the INAF OPAC. Particularly, due to a project funded by the Campania region with European funds, the Observatory of Capodimonte has reordered, restored, cataloged, and digitized 147 books from the fifteenth to the eighteenth century. About 82.000 images, stored in the ICCU database, are available on Internet Culturale, the portal of the Ministry of Heritage and Cultural Activities.[3] The Observatory of Rome has also started the digitization of their manuscripts and incunabula. Some samples of digitized texts are already present in Polvere di stelle, the web portal of the Italian astronomical cultural heritage.

3. Instruments

The Museums Unit is responsible for preserving the collection of historical instruments located in the various INAF research centers. The Museums Unit consists of six museums, which include the observatories of Naples, Brera, Palermo, Padua, Bologna, and Rome, and the observatories of Catania, Cagliari, Teramo, Arcetri, Trieste, and Turin, which hold the instrument collections.

[3]The final act of the project was the publication of a catalogue entitled *Le Cinquecentine dell'Osservatorio Astronomico di Capodimonte* (Olostro Cirella, and Caprio 2014).

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Figure 3. The Arabic astrolabe made by Ibn Sahid el Ibrahim, Valencia, 1096

The historical instrument collection consists of a total of over a thousand pieces and includes instrumentation of various kinds: quadrants, sextants, telescopes, globes, clocks, mathematical, and surveying instruments, barometers, and more ranging from the eleventh century to the first half of 1900. The most ancient instrument is an astrolabe, which dates back to the year 1090 and it is held in Rome (see Figure 3).

The various instrument collections were formed through the course of each observatory's day-to-day operations. When instruments were no longer suitable for research, they were replaced, but the older instruments were kept as part of the collection. The only exception to this is the Copernican Astronomy Museum, which belongs to the Astronomical Observatory of Rome founded in 1873 by donations of Copernican memorabilia from the Polish people. The establishment of the museum was put into the hands of the Polish historian Arturo Wolinsky, a major collector of Copernican memorabilia.

The INAF instrument collections have not been catalogued according to a common standard until now because, before the establishment of INAF, each observatory carried out cataloguing autonomously. In order to standardize the work done in each research center, a cataloguing software has been acquired which allows the creation of standard cataloging form in compliance with the PST (Scientific and Technological Heritage) description developed by ICCD (Central Institute for the Catalogue and Documentation) belonging to the Ministry of Heritage and Cultural Activities.

4. Documents

In Italy, there are twelve astronomical historical archives: eleven belong to INAF, and one belongs to the Physics and Astronomy Department of Bologna University. The archives collect the body of records that are the written evidence of the activity carried out by each observatory. The historical archives have been formed as a result of the accumulation of documents produced or received by the observatories. The most ancient document of the observatories' archives dates back to the seventeenth century and it is

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kept in the Bologna archives. These documents, both administrative and scientific, and mainly handwritten, now represent a primary source for the history of science.

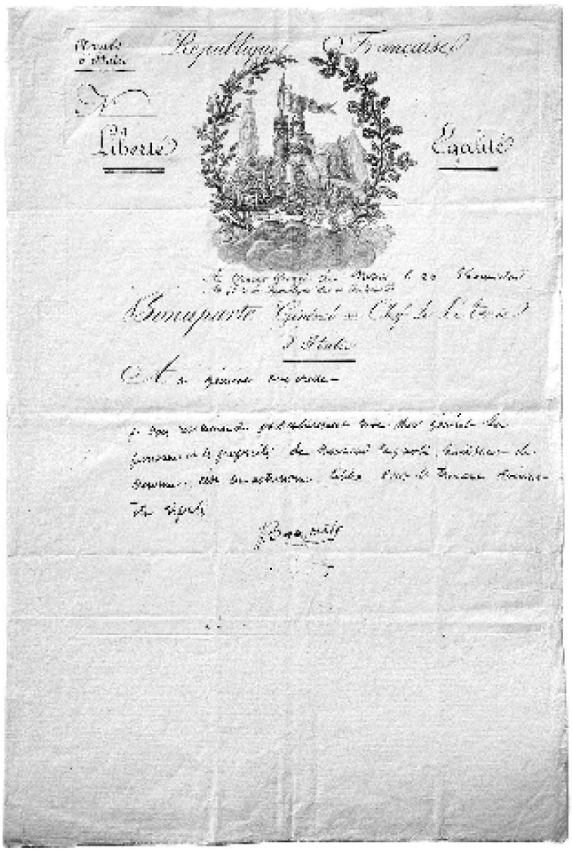

Figure 4. Letter written by Napoleon Bonaparte to General Augereau, 12 August 1796

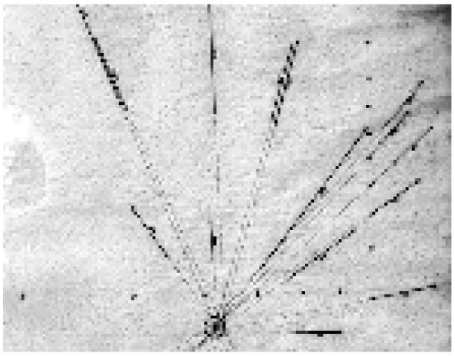

Figure 5. Shooting stars in the night of San Lorenzo, 1871

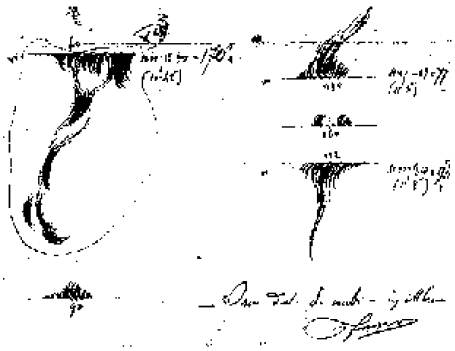

Figure 6. Huge and bright ejections of the solar plasma, 17 January 1926

The observatories historical archives contain various documents, including astronomical observations logbooks (see Figure 5); meteorological data; letters about scientific discoveries; and reports from journeys, maps, and drawings (see Figure 6). The content of the documents is not merely scientific but includes rich information about the relationships among the astronomers, the politicians, and the society of their time (see Figure 4). As the astronomers often used to live inside the observatories, the archives also include private documents, such as letters, accounts, diaries, and family records.

Like all the archival documents, those kept in the observatories are unique pieces that provide indispensable support for historical research. For this reason, since 1980, astronomical observatories have started a process of reordering, inventorying, and preserving their historical archives, as they are increasingly aware of their importance for the study of the history of science. Further, astronomical observatories are aware of the need to safeguard this fragile heritage from further decay. In 1983, the Observatory of Brera in Milan was the first observatory to establish a preservation, restoration, and promotional program of its historical archives, and was soon followed by other observatories such as Turin, Bologna, and Naples.

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Figure 7. The home page of Polvere di Stelle available at www.beniculturali.inaf.it

In 2000, the *Specola 2000* Project started, whose aim was to reorganize, inventory, and promote the documents held in the eleven astronomical observatories archives and in the archive of the Department of Astronomy of the Bologna University. At this point, some observatories have almost completed reordering and inventorying their collections (Brera, Bologna, and Palermo), while others are still working (Arcetri, Padua, Rome, and Trieste). Some are still at an early stage of reorganization (Rome), while others have yet to start (Teramo and Cagliari). In order to standardize the descriptions of each inventory, the observatories prepared new cataloguing software that follows the international archival standards ISAD(G) (General International Standard Archival Descriptions).

In 2009, on the occasion of the International Year of Astronomy, the website Polvere di stelle was created. It was the first website of an Italian scientific institution. A booklet with the same title was printed (Gargano, Gasperini, and Mandrino 2010) as a companion piece to present the archival heritage of the observatories and promote the access to the historical records (Gargano, Gasperini, and Mandrino 2010) to the public.

5. From Astrum 2009 to Stardust

In 2009, during the celebrations of the International Year of Astronomy, a coordinated effort by INAF allowed the exhibition of a range of the historical and scientific heritage. The exhibit, "Astrum 2009," was held on the prestigious site of the Vatican Museums.

The extraordinary success of this exhibition, combined with a bilingual catalog (Chinnici 2009), has produced a renewed collaboration among the different offices for the study, preservation, and promotion of the astronomical heritage owned by INAF and the Physics and Astronomy Departments of Bologna and Padua Universities. In 2013, a database of the historical archives and museum collections was created. The web

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page *Polvere di stelle* — Stardust,[4] originally created in 2010 to present and provide an interface to search the Italian astronomical historical archives (Gargano, Gasperini, and Mandrino 2010), was redesigned as a new integrated web portal. The astroBID — astronomical Books, Instruments, and Documents — offers the varied and interesting materials to users in a simple way.

Polvere di Stelle, the single web portal of the Italian astronomical cultural heritage, presents the collections of twelve Italian astronomical libraries and historical archives and thirteen instrument collections. The web portal allows users to search across all types of material in the AstroBID, and enhances access to further information about the Italian astronomical cultural heritage. Often, the documentary materials concerning instruments, scientific activities, or private notes of the astronomers are conserved in different places. The purpose of the new tool is make the connections necessary to provide a more complete understanding of these historical events. Furthermore, related images can also be accessed in the INAF showcase. In the case for the old books, the digital showcase allows users to browse through their contents and to appreciate the wonderful drawings included in the manuscripts and incunabula.

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