

Waiting for another centennial: first ideas for Astrophysics at the Arcetri Astronomical Observatory (1872-1921)

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Abstract: In 2025, we will celebrate 100 years from the inauguration of the Solar Tower, a landmark of the Arcetri Observatory and the symbol of its full dedication to astrophysics. Yet, ideas to dedicate Arcetri, in full or in part, to the new science have been expressed already since its foundation in 1872 as an Astronomical Observatory. I will review these earlier suggestions and highlight the role of the director, Antonio Abetti, in setting the new course.

Keywords: Arcetri Observatory, Giovanni Battista Donati, Otto Wilhelm Struve, Antonio Abetti

1. A concise summary

The contribution presented at the conference discussed the transition between the *Osservatorio Astronomico di Arcetri*, a facility inaugurated in 1872 mainly for research in classical astronomy and only marginally in the nascent branch of astrophysics, and the current denomination of *Osservatorio Astrofisico* in 1921. Since the presentation was entirely based on two published papers ([Bianchi & Gasperini, 2021](#); [Bianchi, 2021a](#)), I provide here only a summary, with a few more details for the topics that have not yet been presented in English (Section 2).

2. Nostradamus' prophecy¹

These discoveries [of spectral analysis] have given physical astronomy a new impetus, opening up an immense future for the study of the stellar universe, a future whose boundaries we cannot conceive, but which we foresee as so beautiful, great and unexpected, as to impel philosophical curiosity to progress further at any cost, and at the price of any sacrifice ([Nostradamus, 1874](#)).

This “prophecy” on the bright future of astrophysics appeared on the Italian national newspaper *L'Epoca*, on 25 November 1874; it was part of an article titled “On the opportunity of establishing in Florence an observatory of physical astronomy”, signed by an anonymous Nostradamus. The author urged the Istituto di Studi Superiori (from which the University of Florence sprouted in 1924) to dedicate the new astronomical Observatory of Arcetri entirely to astrophysical studies. The Observatory had been inaugurated just two years before, but its founder, Giovanni Battista Donati (1826-1873), died before operations could start ([Bianchi, 2020](#)) (Fig. 1). After Donati's death, the Istituto strived to appoint as director Giovanni Virginio Schiaparelli (1835-1910), director of the Brera Observatory in Milan and already famous for his studies on meteoric showers, but eventually he only became an external scientific advisor for the new observatory (see [Bianchi, Galli & Gasperini, 2011](#)).

¹ Most of the content of this Section comes from [Bianchi & Gasperini, 2021](#).



Fig. 1: The Arcetri Observatory on the day of its inauguration, 27 October 1872. credit: INAF-Historical archives of Rome Observatory).

According to Nostradamus², the choice of Schiaparelli (either as director or advisor) showed that the directorship of the Istituto intended to devote Arcetri to classical astronomy; on the contrary, Donati, a pioneer of spectroscopical studies would have liked, Nostradamus believed, to devote the new facility to astrophysics. Furthermore, research on classical astronomy would have required large expenses, since the Observatory still lacked a costly meridian circle for high-precision measurements of the position of celestial bodies; instead, instruments for spectroscopy, physics and photography, required by the research line Nostradamus suggested, were much less expensive.

Only dedicating Arcetri to astrophysics – Nostradamus continued – the new Observatory could have rivalled with similar institutes that were (or were being) established abroad; among these the observatory that had been proposed to the French Government (eventually, it will be the Meudon Observatory, established in 1876) and for which a report had been presented to the Académie des Sciences on 2 November 1874 (Faye, 1874): indeed, it was this report that must have inspired Nostradamus for publishing his article (a good part of which, including the *prophec*, it's a mere translation of the French text into Italian).

At the beginning of the following year, it was the time for Schiaparelli to present his views on the Arcetri Observatory. In a report asked by the Istituto, he stated that the same aspect of the building, with a large (and yet empty) room for meridian observations, declared its intended destination to classical astronomy (Schiaparelli, 1875; Bianchi, Galli & Gasperini, 2011). Schiaparelli had on his side the original ideas of Donati, which, contrary to what Nostradamus believed, had stated that:

The New Observatory, for its position and construction, must be especially directed towards the astronomical observations that are called fundamental, that is the determination of the positions of celestial

² Schiaparelli believed that Nostradamus was the engineer Demetrio Emilio Diamilla Muller (1826-1906) (Bianchi & Gasperini, 2021).

bodies. This purpose, although less universally understood, and, I will say, less seductive than those other studies that target the physical constitution of the stars, is still the most important of astronomy (Donati, 1873, as reported in Bianchi, 2020).

Clearly, the founder of Arcetri, despite its interests in astrophysics, had thought the new observatory as a place mainly for pursuing positional astronomy; a project in line with his other interests in astronomy-supported geodetical studies (Bianchi, 2020). Beside Donati, Schiaparelli (1875) asked for the opinion of another champion of classical astronomy, his friend Otto Wilhelm Struve (1819-1925), director of the Pulkovo Observatory in Russia. Struve's concerns about astrophysics were mainly about its mathematical rigor, as he already expressed in 1869 at the general assembly of the *Astronomische Gesellschaft*:

a completely new branch of astronomical science has emerged in recent years, astrophysics, whose vigorous development to date justifies the boldest hopes... While Astronomy is particularly the exact natural science in which theory and observation go hand in hand and support each other, there is still far too much room for arbitrary explanation in astrophysics, since neither astrophysical observations can be expressed strictly enough in figures..., nor has mathematical analysis sufficiently taken on the task of subjecting the practical acquisitions of astrophysics to its rigorous examination... In time, these aims must and will be achieved (Bericht..., 1869, pp. 243-244).

In the letter he wrote for Schiaparelli's report, Struve repeated the same concepts and stressed that it was not time yet to devote the full resources of a great Observatory as Arcetri to astrophysics. Only when a large amount of data will be acquired and ordered, Struve said:

will the time have come for the great observatories to devote themselves with all their strength to this part of science, and to raise this branch to the heights of the other branch, which we call mathematical astronomy, by means of exact and relevant measurements (Schiaparelli, 1875, p. 8).

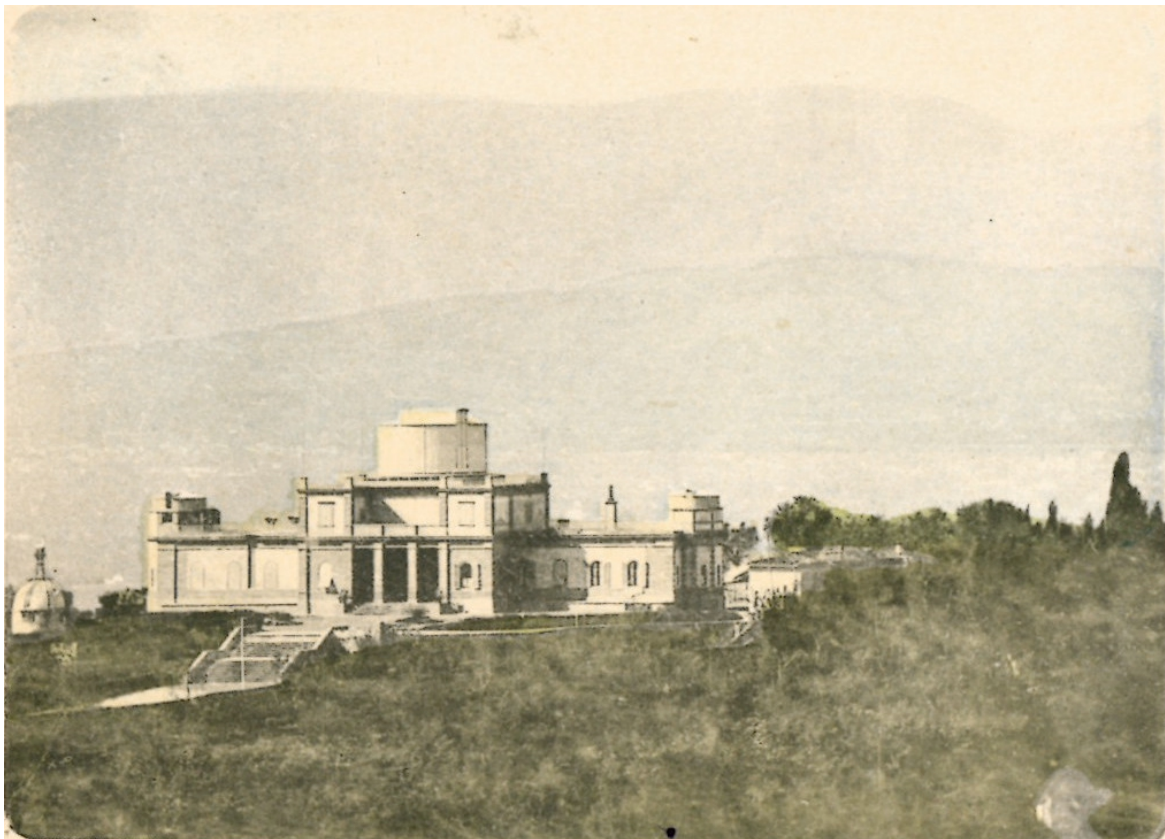


Fig. 2: The Arcetri Observatory at the turn of the century (picture from a postcard posted in 1900; private collection)



Fig. 3: The Observatory and the Solar Tower in 1933 (INAF-Arcetri archive).

3. Antonio Abetti ushering astrophysics in Arcetri³

Two decades after the death of Donati, a new director was finally chosen for Arcetri: Antonio Abetti (1846-1928). Abetti, devoted to classical astronomy, decided to follow the directions laid by Schiaparelli and Struve and wait for a further development of astrophysics. Yet, he was open to explore the possibility of introducing astrophysical studies in the Observatory, provided they did not interfere with the main program in classical astronomy: this was expressed already in 1894 during a visit of the eminent US astrophysicist George Ellery Hale (1868-1938).

In the following years, Antonio Abetti kept contact with Hale, also thanks to his son Giorgio Abetti (1882-1982), who visited the Yale and Mt. Wilson Observatories in the US (two creations by the American astrophysicist). The idea sprouted of building in Arcetri a tower telescope similar to those used at Mt Wilson to study the Sun spectra and monochromatic images (a Solar tower, as Giorgio called it). A first project to build the tower in front of the Observatory (Fig. 2), at the place of the isolated dome on the left of fig. 1, was discussed by Antonio and Hale late in spring 1909, when Hale again visited the Observatory. After WWI, the project gained momentum with the move to the Arcetri hill of the Physics Institute of the nascent University of Florence by the physicist Antonio Garbasso (1871-1933). The building of the solar tower started at the end of 1919, in the definitive position between the Observatory and the Physics Institute. The definitive dedication to astrophysics was completed with the change of the denomination to Arcetri Astrophysical Observatory in 1921, the passing of the directorship to Giorgio Abetti at the retirement of his father the same year, and finally the inauguration of the Solar Tower in 1925, a century ago (Fig. 3).

³ This section is a summary of [Bianchi, 2021a](#). For more details on the role of Hale and Giorgio Abetti in the development of astrophysics in Italy [Bianchi, 2021b](#).

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