

## THE ASIAGO ASTROPHYSICAL OBSERVATORY AND THE RECENTLY REFURBISHED 1.22 m GALILEO TELESCOPE

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Received: 2011 November 23; accepted: 2011 November 25

**Abstract.** A history of the 1.22 m Galileo telescope of the Asiago Astrophysical Observatory is described.

**Key words:** instrumentation: telescopes – history of astronomy

The 2011 Asiago Meeting on Symbiotic Stars was a nice opportunity to celebrate the overhauling of the 1.22 m telescope and the dedication of a new conference hall. The conference hall has been opened for the 2009 International Year of Astronomy, and it is regularly hosting meetings and classes. The 1.22 m telescope, after 70 years of continuous operation, has been profoundly refurbished in its mechanics, optics and instrumentation, opening the prospects of a fruitful and updated new research life.

The 1.22 m telescope was officially commissioned in 1942 and it was, at that time, the largest telescope in Europe, 2 cm larger than the Berlin-Babelsberg telescope owned now by the Crimean Observatory. Telescope truss, the (English) mount and dome were built by the Officine Galileo in Firenze, while the optical components were made by the Istituto Nazionale di Ottica, at that time lead by Vasco Ronchi. Two optical configurations were implemented: a Cassegrain focus (focal length 23 m, focal ratio  $f/19$ ) and a Newtonian one (focal length 6 m, focal ratio  $f/5$ ). To reach the latter, at the top of the telescope, astronomers made use of a dedicated gauge-line platform climbing up along the bended ceiling of the dome.

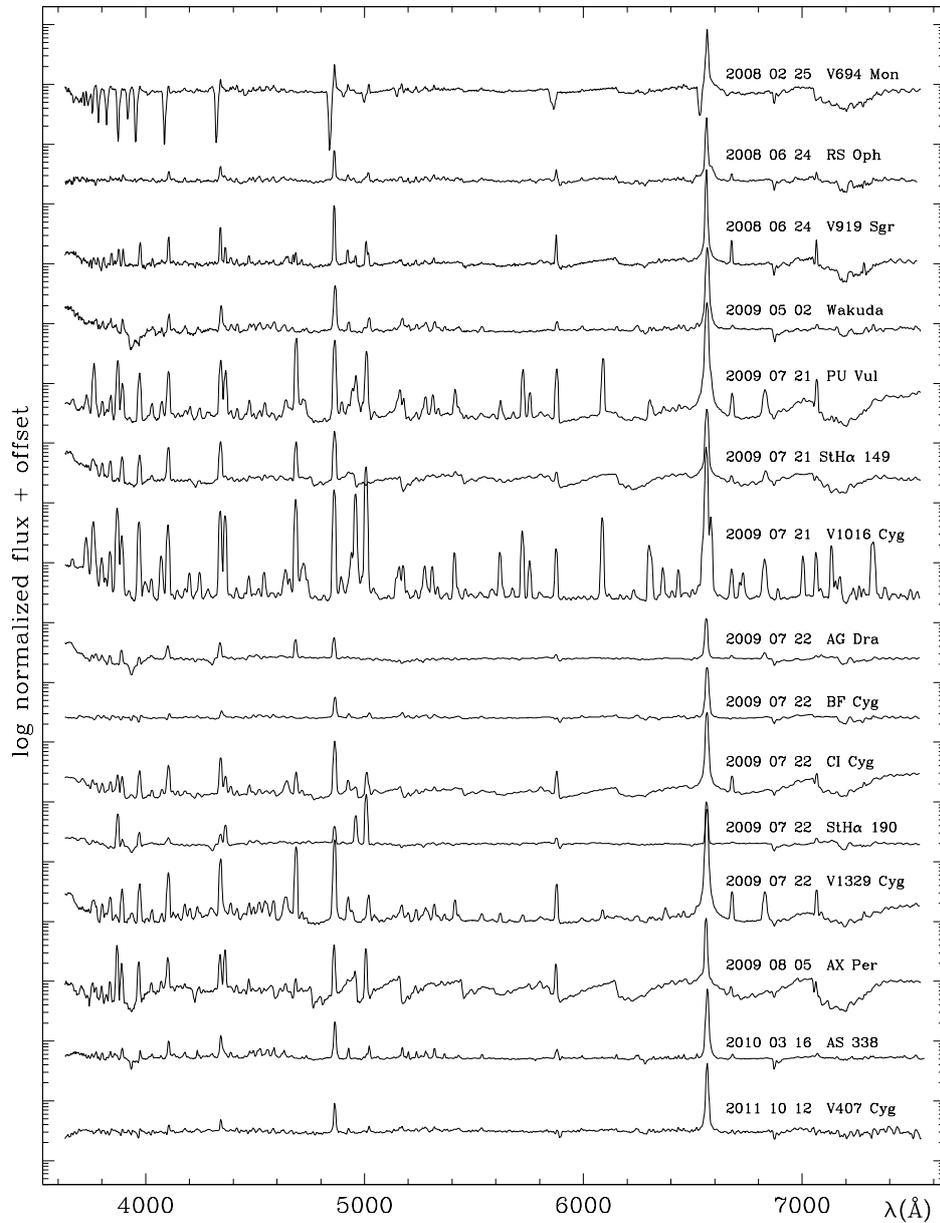
The telescope saw the first light on 1942 May 6, however, the real scientific activity has begun in 1946, after the end of the World War II, when the instrument was equipped with a 4-camera prism-spectrograph mounted at the Cassegrain focus, offering a wide range of resolving powers and extended ultraviolet transmission. Over the years, a great assembly of instruments were added to the telescope, from grating spectrographs and image intensifiers, high-speed multi-channel photometers, to photographic cameras housing a large collection of normal, interference and liquid filters.

The first paper, *On the position of the comets Oterma 1 (1942 b), Oterma 2 (1942 f) and Whipple-Fedtke (1942 g)* by A. Gennaro and S. Taffara, containing the data acquired on the 1.22 m telescope, was published in *Memorie della Societa Astronomica Italiana*, 17, 209, 1945. The three comets were imaged on photographic plates at the Newtonian focus from 1942 December 22 to 1943 July



**Fig. 1.** The 1.22 m telescope of the Asiago Astrophysical Observatory (University of Padova), dedicated to Galileo Galilei. Erected in 1942, at that time the largest in Europe, it has been recently completely refurbished and now it is remotely operated with a minimal in situ technical support. The main instrument is a Boller & Chievens spectrograph and a large format CCD, with the whole optical train optimized for high ultraviolet sensitivity. In addition to active research programs, the telescope is accessed regularly by outreach programs and student training sessions.

9. The first symbiotic star studied with the 1.22 m telescope was T CrB at the time of its 1946 outburst. The measurements appeared in the form of a short note written by S. Taffara in the Contributions of the Asiago Observatory (1949).



**Fig. 2.** A set of 15 spectra of symbiotic stars obtained with the refurbished 1.22 m Galileo Telescope. The spectra are absolutely flux calibrated and normalized. An offset has been applied for a better displaying. Dates of acquisition are also reported.

Some other dates are important for the Asiago Observatory: the year 1953 marks the advent of prof. Leonida Rosino as director of the observatory, and since then the impact of the Asiago name into the international astronomical community has increased significantly. During his charge, the Department of Astronomy

and the Astronomical Observatory of Padova started to work in strong and fruitful collaboration, laying the foundations for the construction of a series of new telescopes in Asiago: a 50/40 Schmidt Telescope in 1958 (known as "The Little Schmidt"), a 92/67 Schmidt Telescope in 1967 ("The Large Schmidt") and the 1.82 m Copernico Telescope atop of the Mount Ekar in 1973. The 1.82 m telescope is the largest optical telescope operating in Italy (by INAF, the National Institute for Astrophysics).

In 1992 the telescope was equipped with a CCD detector in replacement of the photographic plates and six years later, in 1998, the 4-channel prism-spectrograph at the Cassegrain focus has been replaced by a Boller & Chievens (B&C) spectrograph owned by the Astronomical Observatory of Padova. The B&C is still operating and can be equipped with four different diffraction gratings, 300, 400, 600 and 1200 ln/mm giving an increasing power resolution from 2.3 Å/pix to 0.57 Å/pix.

Between 2002 and 2004 the telescope underwent the first of the two major refurbishments in recent years: the old  $512 \times 512$ , 19  $\mu\text{m}$  pix-size front-illuminated CCD was replaced by the Andor iDus DU440  $2048 \times 512$ , 13  $\mu\text{m}$  thinned back-illuminated CCD. Further, an Andor iXon DV885 camera (field of view  $4.2' \times 3.7'$ , 0.43 "/pix resolution) was mounted to the spectrograph for autoguiding, and the control-room was moved to the first floor and enlarged to give space for educational workshops and activities for students.

Recently, between June and September of 2011, the telescope was refurbished again. It was shortered by removing the Newtonian focus support ring, the secondary mirror was replaced and the primary mirror was slightly modified in order to achieve the 12 m focal length (focal ratio f/10) instead of the original 23 m. The reduced focal ratio is now best suited for the use of the B&C spectrograph, which originally has been designed for the f/8 class telescopes. All the optical components were re-alluminated or cleaned with collodium, and the performances of the telescope are now extremely improved in terms of efficiency and spectral resolution. Figure 2 shows a set of symbiotic star spectra obtained with the refurbished 1.22 m telescope and the B&C spectrograph (300 ln/mm, 250  $\mu\text{m}$  slit width, 2.3 Å/pix).

Nowadays the three major telescopes in Asiago (1.22 m, 1.82 m and the Schmidt) operate in close synergy thanks to the firm collaboration between the INAF – Astronomical Observatory of Padova and the Department of Physics and Astronomy of the University of Padova, the two institutions in charge of the Asiago facilities. Imaging, photometry, high- and low-resolution spectroscopy, polarimetry and spectro-polarimetry are all possible with the Asiago telescopes and instruments, together with seminar rooms available for outreach activities, scientific meetings and workshops, guest rooms and many other facilities in an enjoyable environment context.

**ACKNOWLEDGMENTS.** We would like to thank Lina Tomasella, Stefano Ciroi, Francesco Di Mille, Sergio Dalle Ave and Ulisse Munari for the historical material they provided in preparing of this preface.