The Kryoneri Observatory

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1. History

In 1916 D. Eginitis, at that time Director of the National Observatory of Athens and Professor of Astronomy in the University of Athens, writes:

> "The Greek national benefactor and personal friend of mine, Marinos Korialenios, who lately died in London, has disposed nearly the whole of his great estate for national purposes and bequeathed at my request to the National Observatory of Athens the amount of Drs 200.000 for the purchase of a big equatorial telescope. By means of this bequest, the major part of which has already been collected and deposited with the National Bank of Greece, our Observatory will soon obtain the desired powerful instrument which under the clarity of the sky of Attica will undoubtedly offer great services to the science".

In 1969 Dr. S. Plakidis, Emeritus Professor of Astronomy in the University of Athens and Honorary Director of the Astronomical Institute of the National Observatory of Athens writes the following in connection with the M. Korialenios bequest: "Unfortunately it has not been possible to acquire the Korialenios telescope owing to the intervention of several events, such as the First World War, the Asia Minor disaster and other internal anomalies. The Korialenios bequest, which later was amalgamated by Prof. D. Eginitis with the estate of the National Observatory, has suffered considerable mutilation after the Second World War and the subsequent distress of this country to such a degree that it was not sufficient for bringing into effect its purpose".

In 1971, under the supervision of Dr. D. Kotsakis, (Professor of Astronomy in the University of Athens and Director of the Astronomical Institute of the National Observatory since 1965) an application was submitted for the credit of Drs 12.000.000 which was approved by the Government. So an essential increase of the bequest was effected permitting to start enquires and discussions with a view to buy a telescope of 100-120 cm.

Figure 1. The dome of the 1.2 m telescope at Kryoneri.

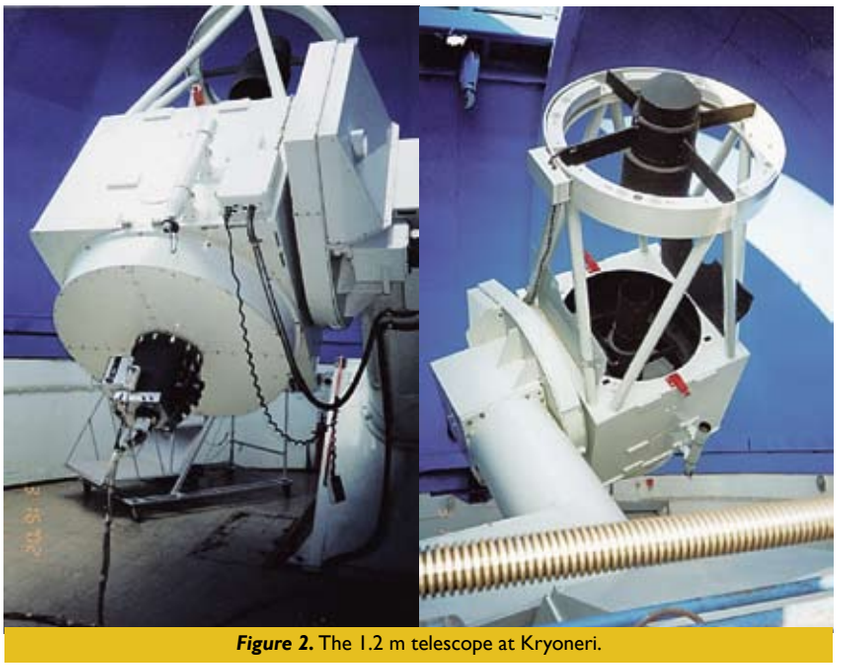

Figure 2. The 1.2 m telescope at Kryoneri.

On August 1972 a contract was signed in Athens between the National Observatory of Athens and the factory Grubb – Parsons and Co of Newcastle, England for the construction of a Cassegrain type equatorial reflector of 120 cm aperture and other auxiliary equipment included (revolving dome etc) for the total price of £ 156.000. The aluminizing plant for the mirrors has also been or-

dered at Edwards High Vacuum Company of Crawlay Sussex, England at a price of £ 35.000.

In parallel with the placing of the order for the telescope several sites away from the plain of Attica were examined by members of the Astronomical Institute on the basis of climatic and meteorological conditions. Among them, a region of Corinth, 22 km SW of Kiato near the village of Kryoneri at a hight of 930 m was selected as the most appropriate, considering that many reasons such as the morphology of the ground, the meteorological conditions, the easiness of access as well as of supply of electricity, water and telephone. The National Observatory of Athens proceeded to the purchase of a land of 60 thousand sq. m. on the selected hill.

Figure 3. The aluminizing plant unit at Kryoneri Observatory.

The construction of the building for the 120 cm telescope and the installation of the dome and the telescope were completed in September 1975. In the mean time a road of 1200 m leading from the highway up to the top of the hill was paved and electricity current was supplied. In parallel water supply from a fountainhead at a distance of 200 m and the fencing of the ground were completed. In 1976 the aluminizing plant was installed in the same building.

2. Telescope and instruments

The installed reflector's primary mirror is an f/3 paraboloid, with a focal length of 3.6 m and a prime focus unvignetted field of about 40 minutes of arc. The f/13 hyperboloidal secondary, 30.6 cm in diameter, gives a Cassegrain effective focal length of 15.6 m. Both primary and secondary mirrors are made from Zerodur blanks and have very low expansion coefficients. There are two 7.5 cm finders.

Throughout its lifetime Kryoneri telescope has been equipped with several instruments which were used, mainly, to perform photometric and spectrographic observations. Amongst the most important one that have been used are (a) an *Infrared Photometer* (constructed by the Royal Observatory of Edinburgh, Scotland) operating in the λλ (1-6 μm) range (b) a *two-beam Multi-mode Nebular-Stellar Photometer* (constructed by the Department of Astronomy, University of Manchester, England) designed to work on both extended and discrete objects emitting either line or continuum radiation in the wavelength range 3700 Å to 9000 Å (c) a *Planetary Camera* (constructed by the National Observatory of Athens) (d) a *Photoelectric spectrum scanner* (constructed by the Department of Astronomy, University of Edinburgh, Scotland) (e) a *Camera for Stellar fields* (constructed by Grabb-Parsons) (f) a *P21 Photometer.*

Since 1996 a Series 200 CCD *Photometrics* camera (516×516 pixels) is the main scientific instrument of the telescope.

3. Research Activities

Throughout its thirty year lifetime several projects have been conducted leading into more than 100 refereed publications in international astronomical Journals. These projects include:

- Optical variability studies of Active Galactic Nuclei (AGN) on time scales of a few minutes to long term monitoring campaigns (Fig. 4).

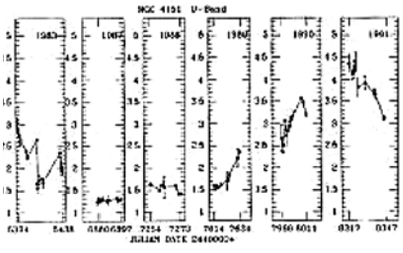

Figure 4. Light curve of the Seyfert galaxy NGC4151.

- Photometry and monitoring of Cataclysmic Variables (CV) for determining their photometric properties as well as deriving kinematical information of their systems.

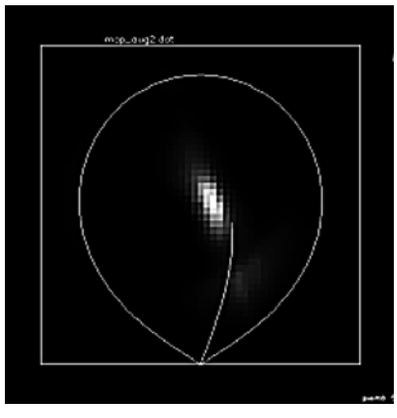

Figure 5. Velocity field of the Cataclysmic Variable EX Draconis created by a series of images taken with the 1.2 m telescope at Kryoneri.

- Variability studies of Symbiotic Stars and their kinematics where velocities as high as 6000 km/sec are observed.
- Observations aiming at the detection of extrasolar planets have been conducted from the Kryoneri site using the WASP camera.
- Wide-field observations of the filamentary structures of Supernova Remnants have been acquired with the 1.2 m telescope at Kryonei (using the MWFC camera) aiming at de-

termining their formation and evolution as well as their correlation with other filamentary structures in their region.

- Variability studies of gravitational lenses aiming at determining the time delay in different optical bands and subsequently a more accurate calculation of the Hubble constant.

4. Future prospects of the 1.2 m Kryoneri Telescope

Currently (summer 2007) the Institute of Astronomy and Astrophysics of the National Observatory of Athens has reached an agreement with members Cork Institute of Technology, Ireland, in funding the upgrade and robotization of the telescope (including a new telescope control system and new motor drives as well as automatic dome rotation).

In parallel, a fast, high-precision optical photometer (Toffee-cam – see Fig. 6) is currently being developed in the Cork Institute of Technology (funded by the Irish Research Frontiers Programme 2005) which will be used both with the Kryoneri and the "Aristarchos" telescopes. At the heart of the photometer will be two state-of-the-art, essential noiseless CCDs (iXon – Andor Technology) with a high read-out-rate (34 frames per second) aiming at high-time-resolution, high-precision photometry. One of the two CCDs have already been tested with the Kryoneri telescope during an observing run in April 2007 and it's unique performance was witnessed.

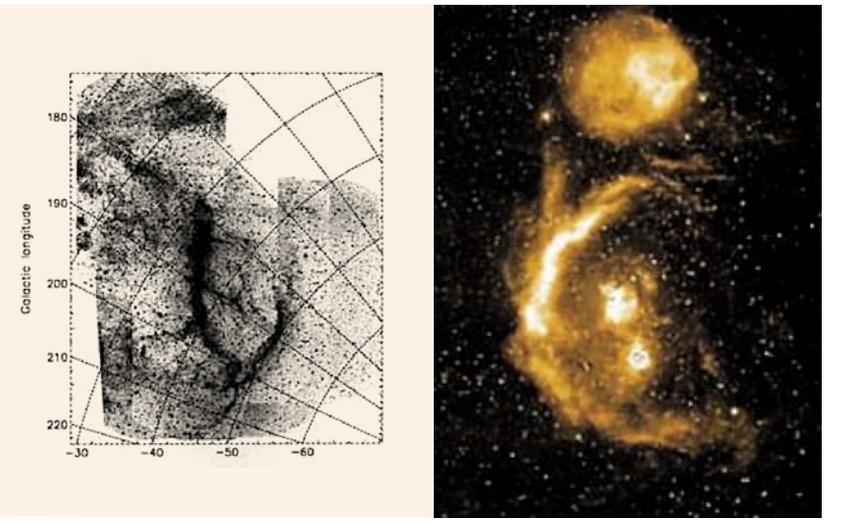

Figure 6. Wide Field imaging (~50°) of the Cygnus arc (left) and of the Orion nebula (right) taken with the MWFC camera attached to the 1.2 m telescope at Kryoneri.

We foresee that, after its transformation, the telescope will become a state-of-the-art facility for performing top quality astronomical observations as well as having a large contribution in public outreach activities.

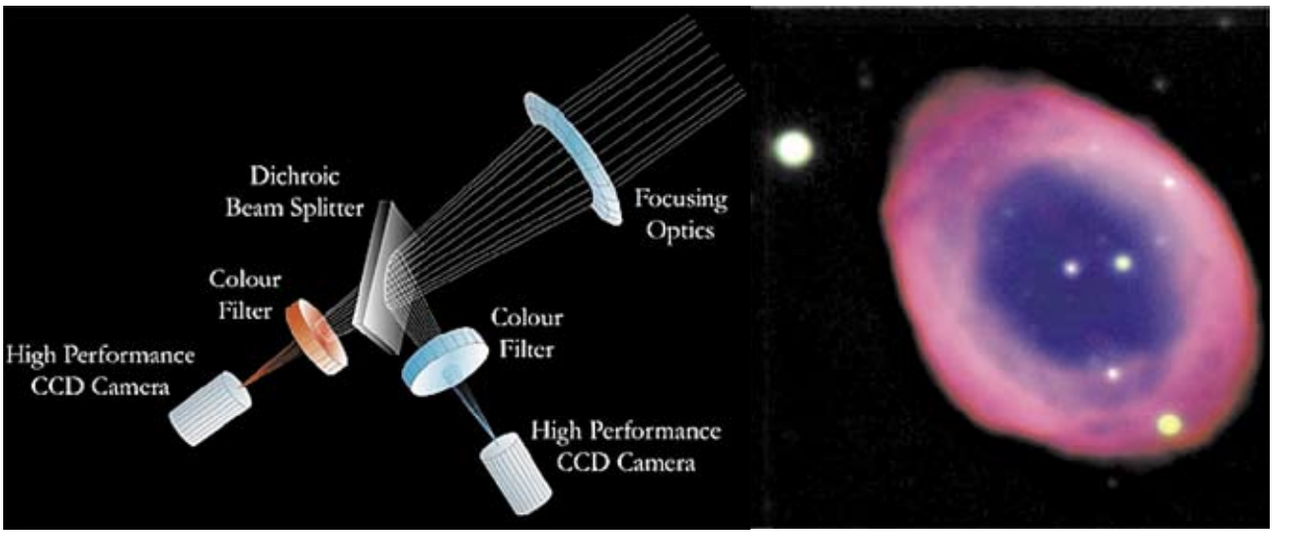

Figure 7. The optical train of the Toffee-cam (left) and sample observation of the Ring Nebula taken with the iXon camera on the Kryoneri telescope. A seeing of 0.9" was measured during these observation.