Astrophysics with the 1.5m TIRGO telescope on Gornergrat

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The TIRGO telescope

TIRGO is a 1.5m telescope optimized for observations at near- and mid-IR wavelengths, between 1 and 20 micron. It is located at 3100 m of altitude on the Gornergrat mountain over Zermatt. The very high and cold position allows unique observation conditions, especially during winter: transparent sky, stable atmospheric transmission, low background, all very important properties for infrared observations. The telescope is an italian national facility opened also to foreign researchers. It is equipped by a complete set of instruments: a fast single-element photometer, for lunar occultation and accurate photometry of bright sources; a panoramic camera, for imaging and photometry of faint sources; a mid-resolution spectrometer, and a mid-IR camera.

Scientific activity and main results

During the last two years, the most requested instrument, the near-IR camera ARNICA, was in use at the larger telescope TNG, a new-technology 3.5m telescope on the Canary islands, where many scientific programs were carried out. In the mean time, TIRGO observations were done mainly by using the photometer FIRT. As an example, lunar occultations of stars made it possible to accurately measure stellar diameters to improve the classification of cold stars and measure how many double and multiple stars are present in the clusters. Nearby galaxies were also measured using FIRT to study their surface brightness and stellar populations.

At wavelengths between 3 and 20 micron, the atmosphere is very bright because of thermal emission and is rapidly variable, therefore it is very difficult to obtain good astronomical images. Nevertheless, there are several strong scientific arguments to observe at these wavelengths. The TIRGO telescope offers unique opportunities in this field for the site properties, and a new mid-IR camera TIRCAM-II was build and tested during the 2000. As an example of its use, fig. 1 shows the image at 12.5 micron of a cluster of forming galaxies in the Orion nebula. The observed region is enshrouded in a dusty region and therefore it is dark at optical wavelengths. On the contrary, at 12 micron the light can escape much more easily from the inner part of the nebula and therefore it is possible to study these regions in great detail.

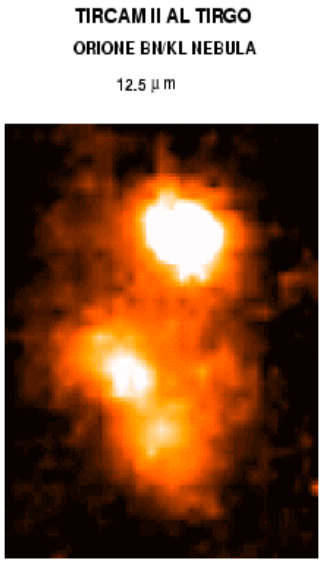

Fig. 1: mid-IR image of a cluster of forming stars in the Orion nebula. The field-of-view is 24"x29" with a pixel of 0.77". The total integration time is 2.5 min. The image was obtained by chopping between the object and the nearby sky at a frequency of 3 Hz

Up to now, 10 papers were reported to be published or accepted for publications during the year in international journals, see the list below.

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