



First light observations with TIFR Near Infrared Imaging Camera (TIRCAM-II)

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Abstract. TIFR near infrared imaging camera (TIRCAM-II) is based on the Aladdin III Quadrant InSb focal plane array (512×512 pixels; 27.6 μm pixel size; sensitive between 1 - 5.5 μm). TIRCAM-II had its first engineering run with the 2 m IUCAA telescope at Girawali during February - March 2011. The first light observations with TIRCAM-II were quite successful. Several infrared standard stars, the Trapezium Cluster in Orion region, McNeil's nebula, etc., were observed in the *J*, *K* and in a narrow-band at 3.6 μm (*nbL*). In the *nbL* band, some bright stars could be detected from the Girawali site. The performance of TIRCAM-II is discussed in the light of preliminary observations in near infrared bands.

Keywords : instrumentation: detectors – instrumentation: photometers

TIRCAM-II uses a closed cycle helium cryo-cooler to operate the FPA at 35 K. The temperature is maintained by a heater inside the near-infrared dewar and controlled by a LAKESHORE temperature indicator/controller unit. In front of the FPA is a 8 position filter wheel with *J*, *K*, *K_{cont}*, *H₂*, Br- γ , polycyclic aromatic hydrocarbon (PAH) and *nbL* filters. The filter wheel is motorized and is controlled from the control PC. The detector electronics consists of two packages : a computer and a dewar interface. These two electronics packages are connected by 60 feet fiber optic cables. These two electronics interface packages provide the clocks and biases to FPA and digitizes data (16 bit) from FPA.

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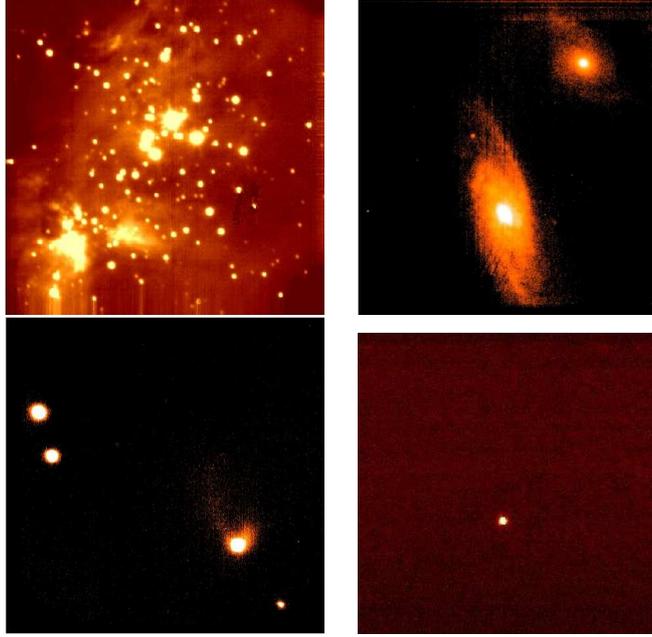


Figure 1. TIRCAM-II images (clockwise from top left) of the Trapezium cluster in K band, the galaxy pair NGC 4567 & NGC 4568 in J band, the star Procyon AB (BS 2943) in nbL band and the McNeil's nebula in J band.

The observations were performed during the bright sky (near full moon period) in February - March 2011, using TIRCAM-II system at $f/10$ Cassegrain focus of the 2 m telescope of IUCAA Girawali Observatory (IGO). The image scale and the array field of view is $0''.27$ per pixel and $\sim 2'.3 \times 2'.3$, respectively. We had observed several bright infrared standards, the Trapezium cluster in Orion region, McNeil's nebula, etc., in J , K and nbL bands during the engineering run. The typical seeing was $1'' - 2''$ during the observations. Figure 1 shows the sample images taken with TIRCAM-II using the 2 m IUCAA telescope. The limiting magnitude obtained from the analysis of the Trapezium cluster field is 16.3 ($T_{\text{int}} \sim 1050\text{s}$) and 14.5 mag ($T_{\text{int}} \sim 164\text{s}$) in J and K band, respectively. The sky brightness ($\text{mag}/\text{arcsec}^2$) measured with TIRCAM-II at IGO is 15.4, 11.5 and 2.8 in J , K and nbL band, respectively.

The engineering run of TIRCAM-II at Girawali was quite successful. Although the TIRCAM-II observations were made during the bright sky (near full moon period), we could observe sources in the nbL band ($\sim 3.6 \mu\text{m}$) from the Girawali site. In the near future, we plan to explore TIRCAM-II's performance in the PAH ($3.3 \mu\text{m}$) and M ($4.5 \mu\text{m}$) bands from the Girawali and Hanle sites.

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