

AN AUTOMATED SOUTH POLE STELLAR TELESCOPE

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ABSTRACT. An 8-cm optical telescope is constructed for use at the south pole. It is designed to make photoelectric observations of selected stars continuously through an austral winter. The automated operation is controlled by a computer. The aim is to study the variability of the star γ^2 Velorum as well as the condition of the polar sky and the performance of the instrument.

The south pole may be an ideal location for astronomical observations which can benefit from continuous monitoring of variable sources. A telescope (Schneider *et al.*, 1984) was installed at the pole in January 1984 to evaluate the site and observe the interesting Wolf-Rayet binary γ^2 Velorum. After initial testing in that winter, the instrument has been modified and rebuilt. It will be installed at the pole again in January 1986.

The telescope is a two-mirror siderostat with an 8-cm objective and with computer control of all functions. Photoelectric photometry will be carried out with six filters. The standard B and V filters and three interference filters, centered at $\lambda 4686$ (He II), $\lambda 4768$, and $\lambda 5696$ (C III), are selected particularly for γ^2 Velorum. Three other stars, HR 3452, α and β Gruis, are also programmed to be observed. Another interference filter centered at $\lambda 5600$ is used to observe sky brightness also.

The rotating optical head, which consists of the two mirrors, is driven in the azimuthal directions by a stepping motor. The front part (the entrance mirror) can be set manually for a selected altitude (declination). The reflected light is converged through one of twenty-five 5-arc minute diaphragms at the focal plane of the objective. The diaphragms are located on a wheel. The filters are also mounted on a wheel. These wheels are driven by stepping motors for selecting proper diaphragm and desired filter. An EMI9781 multiplier phototube with an electrometer is used to measure the filtered lights.

Provision is made for internal calibration of the photometric system and an internal "frost sensor" will give warning of potential frost/snow build-up on the optical surfaces. A careful thermal design

study has been carried out in order to deal with problems involved with the harsh south pole environment.

The computer system provides for completely automatic operation of the telescope for the entire observing season. Manual computer control is available for unanticipated changes in the observing program, and for diagnostic testing and repair. The data will be stored on magnetic disk and transmitted back to Florida from Amundsen-Scott Station via satellite.

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Reference

- Schneider, G., Wood, F. B., Chen, K-Y., Giovane, F., Oliver, J. P. 1984. Bull. Amer. Astron. Soc. 16, 497.