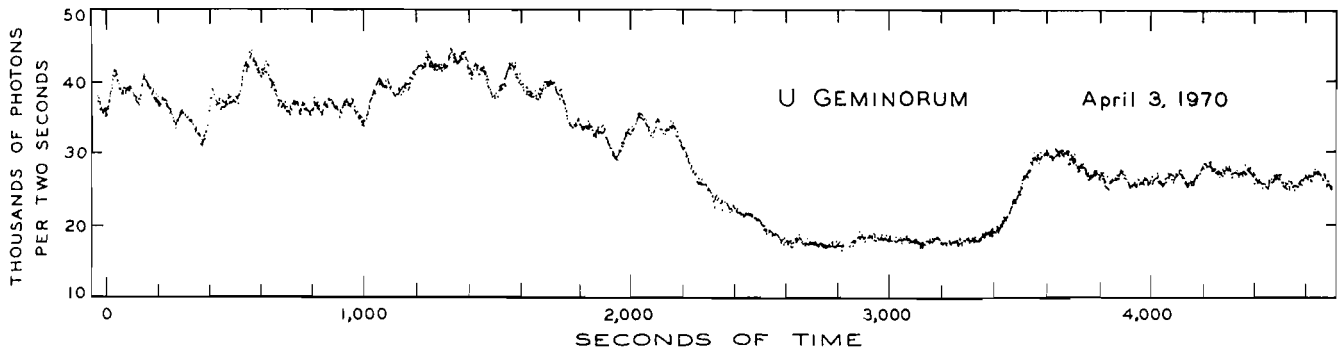

Fig. 2. — *The rapid flickering of the dwarf nova U Gem as measured by Warner and Nather. The flickering comes from a small spot where accreted material from a companion falls onto a white dwarf. Note that flickering stops during the eclipse.*

For the professional who must justify his observing requests on larger telescopes with at least some probability of success, one can pick four or five promising lines:

(a) Extragalactic pulsars: Radio pulses are smeared out or dispersed by electrons along the line of sight. This dispersion makes detection at great distances increasingly difficult and it may be impossible to *find* extragalactic pulsars in the radio without a prior knowledge of the period. Optical pulses are not dispersed and a survey of extragalactic supernovae might result in success. Previous observations suggest that a pulsar's optical luminosity falls off with a very high power ($\geqq 8$) of the period, and hence with the age. Young pulsars could therefore be very luminous and detectable out to tens of megaparsecs with a large telescope. The supernova envelopes will probably remain optically thick for some months after the explosion, so a guesstimate is necessary of the optimum time to search. The real goal is to measure the intergalactic electron density along the line of sight for, with a knowledge of the optical period, radio astronomers should then be able to detect the pulsar and measure its dispersion.

(b) Stellar black holes present an interesting challenge. Their time-scale $\tau \sim GM/c^3 \sim$ milliseconds. A 1-metre telescope should detect ~ 400 photons/millisecond from a possible 10^m black hole, so the detection of the irregular fast flickering that should be a signature of these objects is possible. X-ray binaries like Cyg X-1 are a good place to start.

(c) If experience with Uhuru is anything to go by, the large expansion of X-ray astronomy which the HEOs will bring in the next years should provide a rich harvest for the fast photometrist. The accretion of gas onto degenerate stars ($\tau \sim 10$ to 10^{-3} sec) and black holes (10^{-3} to 10^{-4} sec) implies short-time-scale phenomena, and of course many sources, like the X-ray pulsar Her X-1, have proved to be equally active in the optical.

(d) Cataclysmic variables (novae) clearly display the accretion processes thought to be responsible for the X-ray binaries. In a beautiful series of observations (see Fig. 2) Warner and his colleagues (*Sky & Telescope,* **43,** 82, 1972) have unlocked many of the secrets of these systems, but much remains to be done.

(e) The fastest variations in the extraordinary objects in the nuclei of galaxies, BL Lacs and QSOs place very strong constraints on the physical processes involved (Elliot & Shapiro, 1974, Ap. J., 192, L3). The faster the variation the smaller the object. For a given size, virtually any model will have an upper luminosity limit, and by comparing prediction with observation, many models can be eliminated. In the case of BL Lacs, variations of a few per cent in times of minutes have been reported and there are tantalizing but unconfirmed hints that very fast (10 sec) 50 per cent bursts may occur. Of all the suggested models, only a black hole could accommodate these bursts.

Fast photometry has a short but interesting history and a very exciting future. For a modest cost, say $25,000, a transportable real-time system can be built to use with telescopes both large and small, and it is to be hoped that European astronometry will play an active role in these developments.

STAFF MOVEMENTS

Since the last issue of THE MESSENGER, the following staff movements have taken place:

ARRIVALS

Munich

None

Geneva

Marie Hélène Ulrich, French, astronomer

Chile

None

DEPARTURES

Munich

None

Geneva

Susanne Negre, German, administrative assistant

Chile

Marcel Moortgat, Belgian, technical assistant (mech.)

TRANSFERS

André Muller, Dutch, senior astronomer (from Munich to La Silla)

FELLOWS AND PAID ASSOCIATES

The following astronomers have taken up or will soon take up work as fellows or paid associates at the Scientific Group in Geneva:

Tenguiz Borchkhadze, Russian (Dec. 1, 1976–May 31, 1977)
Jan Lub, Dutch (from Jan. 1, 1977)
Per Olof Lindblad, Swedish (from Jan. 1, 1977)
Michel Disney, British (Jan. 15–April 15, 1977)
Jorge Melnick, Chilean (from March 1, 1977)
Sandro D'Odorico, Italian (March 15–May 15, 1977)
Piero Salinari, Italian (from April 1, 1977)