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FLARE MONITORING OF THE ACTIVE LATE-TYPE SYSTEM YY GEMINORUM

In response to a request by Patrick A. Wayman, Dunsink Observatory, for securing simultaneous optical flare monitoring of YY Gem during the period the object was under observation with EXOSAT and IUE satellites, the variable was set on the observing schedule of Hoher List Observatory. Unfortunately, unfavourable weather conditions did not permit simultaneous observations, and the only successful observing run, which started on 1984, Nov 12/13 at 23:58 UT, had to be terminated at 3:42 UT, just before the onset of the IUE observations.

The instrumentation used was a double beam photometer attached to the Nasmyth focus of the 106 cm Cassegrain telescope. The photometer is especially suited for observations of the light curves of rapid variables and allows the simultaneous monitoring of the variable and a comparison star within the field of the telescope (Geyer and Hoffmann, 1975).

Due to the bright moonlit sky and strong stray light from Castor AB, the U and B bands yielded a very low S/N ratio, which forced us to do the monitoring in the V band only. So we could expect only small flare amplitudes, nevertheless detectable with the superior performance of a double beam photometer. The observing strategy was to monitor variable and comparison star (BD+31°1611) as continuous as possible, with breaks for casual sky measurements (every 15 minutes on the average) and centering controls. Measurements were recorded with a strip chart recorder, time constant was 1 sec.

The reductions presented some unexpected difficulties. In the raw magnitudes minor drift effects (typically about 0^m01 or 0^m02), accumulated during the rather long phases of unattendedness, became apparent and forced us to do a lot of data editing. Second, there was the problem of light contamination from Castor AB. Sky readings taken in the vicinity of the variable were on the average ten times higher than near the comparison star. Moreover, due to the strong forward scattering and (presumably) some minor inconsistencies in making the sky offset, those high sky deflections are more variable than they ought to be. So we decided to use only the sky deflections taken at the com-

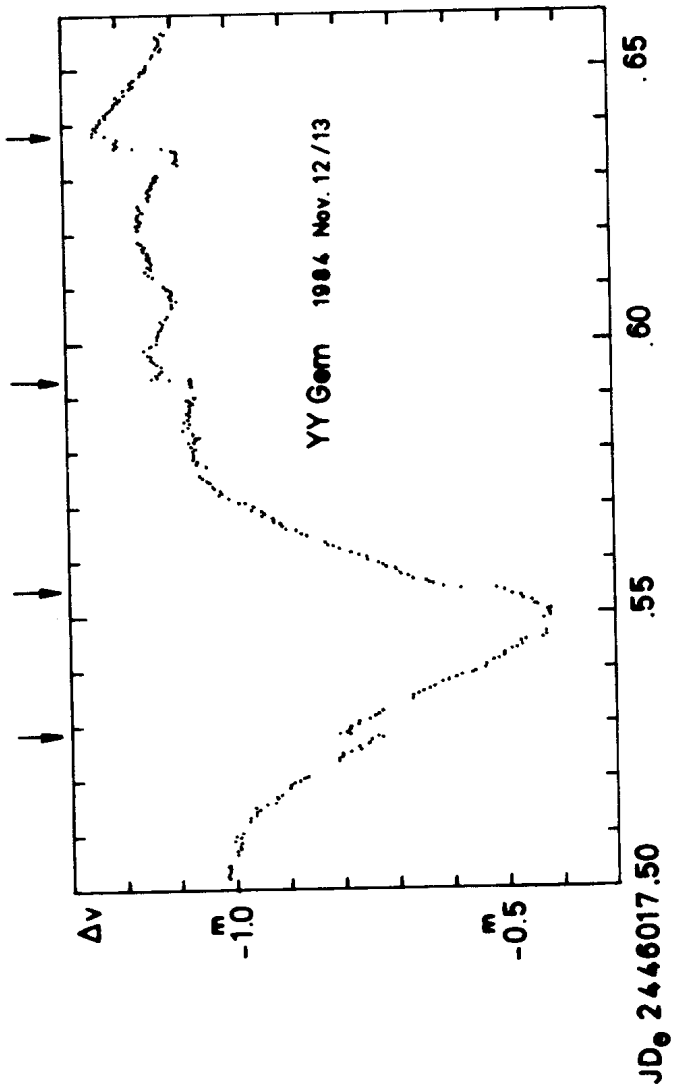


Figure 1. Visual light curve of YY Gem, obtained during 3.5 hours of flare monitoring while secondary eclipse was in progress. Flare events are indicated by arrows. Differential magnitudes, Δv are given in the sense "YY Gem minus BD +31°1611".

Table I. Characteristics of observed flares of YY Geminorum
on Nov 12/13, 1984 (23:58 - 03:42 UT).

No.	Start (UT)	JD hel	Rise time	total duration	Δm
1	00 ^h 36 ^m 08 ^s	0.5280	0.4 min	~ 17 min	0 ^m 09
2	01 14 28	0.5546	0.1 min	~ 20 min	0.09
3	02 09 52	0.5931	0.3 min	~ 20 min	0.07
4	03 10 44	0.6354	0.3 min	27 min	0.15

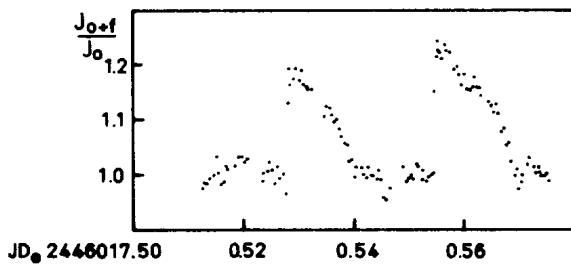


Figure 2. Intensity curves for flare events 1 and 2

parison, scaled up with an appropriate factor when applied to the variable. For the subtraction of the sky background, the measured deflections were interpolated with splines. Obviously, the variable sky background remains a major source of potential systematic errors. For flare monitoring, this should not be very serious because any effects must show up in both the variable and the comparison star deflections. Finally, the differential V magnitudes were evaluated. In order to preserve the internal accuracy of the light curve (the S/N ratio was better for the variable than for the comparison star), smoothed comparison star magnitudes were subtracted. Due to the proximity of the comparison and the use of the V band no extinction corrections were necessary.

Figure 1 shows the light curve obtained. The observations cover the whole secondary minimum, a total phase is indicated. The moment of minimum light,

$$\text{Min II} = \text{HJD } 2446017.5488$$

was evaluated graphically, using only the undisturbed phase interval from JD .5425 to .5545. There is evidence for strong light curve distortion, presumably due to star spot activity; see, e.g., Kron (1952). During 3.5 hours of

observing we noticed four flarelike events whose characteristics are presented in Table I. Intensity curves of flare events 1 and 2 (that were recorded on the descending and ascending branch of the minimum, resp.) are displayed in Figure 2.

The individual observations will be deposited in the I.A.U. Archives of Unpublished Observations of Variable Stars.

E. H. GEYER B.-C. KÄMPER
Observatorium Hoher List
der Universitätssternwarte Bonn
D- 5568 Daun/Eifel, F.R.G.

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