A SEARCH FOR RAPID VARIABLES AND RR LYRAE STARS IN THE LMC ON ESO SCHMIDT PLATES

E. H. GEYER

Astron. Institut der Universität Bonn, Observatorium Hoher List, F.R.G.

Abstract. This is a very preliminary report about a search for rapid variables in extended fields of the Large Magellanic Cloud.

The majority of the approximately 2500 known variable stars in or in the foreground of the LMC are Harvard variables with apparent magnitudes $<16\overset{m}{.}5$ (pg). Since the distance modulus of the LMC is about $18\overset{m}{.}5$ these LMC-member variables are therefore giants and supergiants. The knowledge about the fainter variable-star content in the Magellanic Clouds goes back to Thackeray (1951), especially about the RR Lyrae stars, the determination of the overall distribution of which would be one of the main observational approaches to the structure of the LMC. It was only recently that a search for and photometry of RR Lyrae stars in two smaller fields of the LMC has been carried out by Graham (1973, 1974). Relevant fields in the Small Magellanic Clouds were also searched and yielded very important results, one of which is the fairly small brightness dispersion of the field RR Lyrae stars of the LMC though slightly wider in comparison to those of the SMC and the galactic globular cluster M 3. This can be interpreted in terms of a somehow larger spatial extension of the old stellar population of the LMC, which seems to be very flat in the SMC.

At the IAU-meeting in Prague I presented my view (Geyer, 1968) on the structure of the LMC based on the method of composite photography of UBVR original Schmidt camera plates, namely that the LMC is composed of two galaxies: an extended elliptical one, the main body of which is the optical bar, is superimposed or intermixed with an asymmetrical Sc or SBc spiral galaxy. A similar proposal was also made by Johnson (1959).

This point of view was the background for a running observational programme with the 100/162/307 cm Schmidt camera of the European Southern Observatory, which became operational in 1973. The camera has a vignetting free field of $5\overset{\circ}{.}5$ diameter, and the first 15 mainly *B*-plates at my disposal are centered about 1° north of the bar of the LMC. All plates were taken under medium seeing conditions; therefore they are not resolution limited, and the limiting magnitude is slightly brighter than the theoretical expectation. On the average they are $20\overset{m}{.}2$ in *U*, $20\overset{m}{.}8$ in *B* and $20\overset{m}{.}5$ in *V* in the bar region with high sky background. The relevant exposure times and plate-filter combinations are 40-min on 103a−0+UG1; 20-min on IIa-0+GG385 and 20-min on 103a-D+GG495. These seeing limited stellar images allow on the other hand the blinking for variability down to the plate limit, and variability amplitudes can be detected down to $0\overset{m}{.}4$.

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For a first preliminary survey, a pair of *B*-plates only 1 day in time apart were blinked in two small 10′ wide strips, one in the E-W direction and the other vertical to it crossing the bar of the LMC. These strips meet at the field where the photoelectric sequence of Tifft and Snell (1971) is situated. Nearly 70 variables were found, all of which are fainter than 16^m, the majority $>17^m.5$. The largest observed *B*-variation is $1^m.5$ of an 17th magnitude star. Of course all types of intrinsic and geometric variables on a fairly rapid time scale variation contribute to this sample. No type designation can at this moment be given. By extrapolation over the whole field covered by the plates I expect about 800 variables per plate pair.

It should be mentioned that a similar investigation will be carried out on the SMC by my colleague Dr Seggewiss.

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DISCUSSION

L. Plaut: Do you have long series of consecutive plates?
E. H. Geyer: No.