Photographic observation of globular clusters in the Konkoly Observatory

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In the last years of the XIXth century Solon I. Bailey made photographic observations at Arequipa, Peru, at the observational station of the Harvard Observatory. He obtained long series of photographs on M3, M5, and ω Cen clusters and discovered hundreds of RR Lyrae variables on them.

About four decades later (1938) W. Christian Martin found increased periods based on new plates taken of ω Cen. This result made further research promising. They brought up the idea to grasp stellar evolution through period changes.

In Budapest the photographic observations of globular clusters span almost 30 years (1937–1966) (*Fig. 1*). These observations have been initiated by L. Detre. In the beginning he took the considerable part of plates at the Newtonian focus of the Observatory's 24" telescope. Later the program was continued by the staff members of the observatory. Júlia Balázs-Detre, Tibor Herczeg, György Kulin, Miklós Lovas, Béla Szeidl, and the author participated in the observations.

The globulars M3, M5, M15, M56, and M92 have been photographed systematically. The contribution by G. Kulin and M. Lovas has been extremely high to this plate collection. Apart from a few Kodak products and Agfa Astro special plates, the majority of the plates used were Guilleminot Superfulgur. With a few exception, exposition times extended 10-20 minutes. In course of these three decades hundreds of plates have been obtained on the clusters mentioned above.

In order to study the period changes, mean light curves and O−C diagrams have been constructed. Studies of this type have been published on about 60 RR Lyrae variables in M3 by István Ozsváth (1957) and 21 variables in M15 by Imre Izsák (1957). Further studies based on Budapest plates of M3 concerning 112 measurable variables were carried out and published (Szeidl, 1965) (*Fig. 2*). Later data on 54 RR Lyrae stars in the cluster M15 were published by the author (Barlai, 1989) (*Fig. 3*).

It is worth mentioning that the brightness of overwhelming majority of the RR Lyrae variables in M5 have been measured or estimated by M. Lovas. This database is to be analysed.

In 1975 a new 1-meter RCC telescope was installed at our Piszkéstető mountain station. Since then the photographic observations have continued there until the beginning

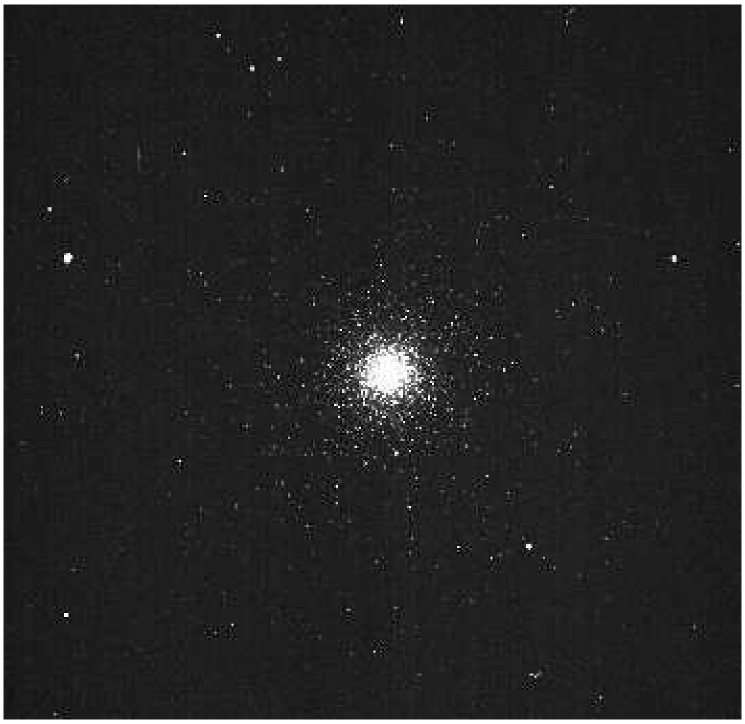

Figure 1: A “historic” photograph from the year 1950.

of the 1990s. Several hundreds of plates have been obtained on M3, M5, and M15 globular clusters. Due to the better resolution, further details can be revealed on the variables closer to the dense central region or the ones having close companions on the plates taken in Budapest with the Newtonian telescope. Analysis of their data means a task for the future.

Although the study of period changes did not fulfill the original expectations to show immediately the direction of cluster evolution still they and the numerous brightness data obtained gave us a deeper insight into the nature of RR Lyrae stars.

The new CCD technique made further photographic observation of globular clusters obsolete (*Fig. 4*). This “old” plate material, however, means a base for new approaches to these fascinating objects.

References:

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Ozsváth I., 1957, *Mitt. Sternw. Ungar. Akad. Wiss.*, No. 42, 81
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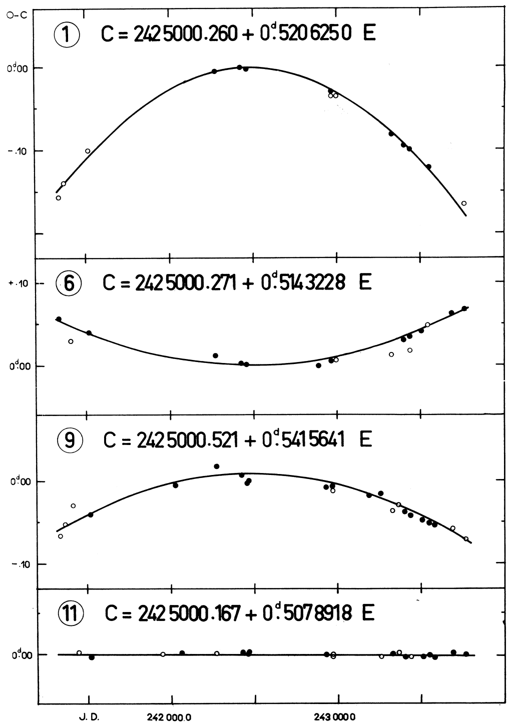

Figure 2: O−C diagrams of some RR Lyrae variables in M3. Increasing and decreasing periods can be seen and a constant period, as well (Szeidl 1965).

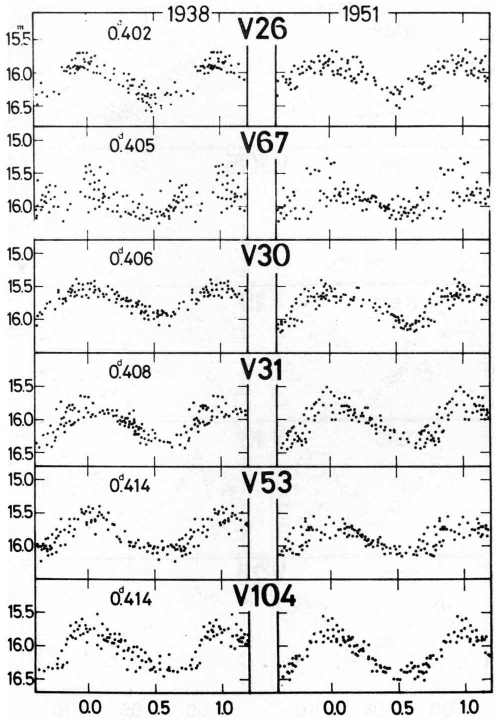

Figure 3: Some mean light curves of RR Lyrae stars in the globular cluster M15. Except V104 the other stars are of double mode nature or show suspect of Blazhko effect (Barlai 1989).

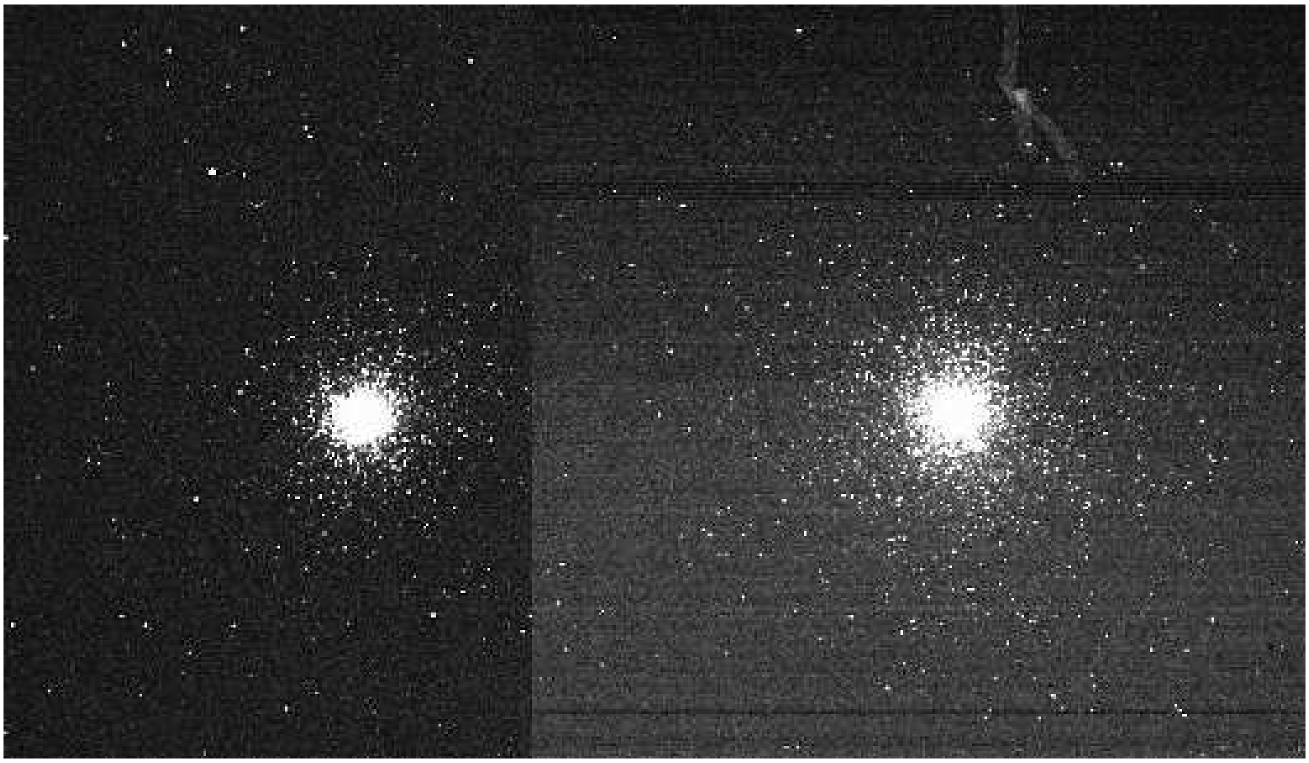

Figure 4: Image of M15 on the plates taken with the Newtonian telescope and with the RCC telescope, respectively. Casting a glance on the two photographs they clearly show the improvement in the resolution.