4. Microlensing Candidates

The theoretical microlensing magnitude variation has been fitted to the observed light curves after a preselection made among the time series, on the basis of consecutive three-σ deviations with respect to the minimum. The achromatism of the amplifications can be checked only for stars which, when not amplified, are sufficiently above the limiting magnitude of the red plates. The resolution is also better for the IIIaJ plates.

From the reduction of the first half of the field so far performed, some ten events appear to be reliable candidates for microlensing amplifications. Two examples, chosen among these, are shown in Figure 1.

Among the candidates, an object with an unusual light curve has been detected with three consecutive peaks within 7 days. This behaviour is quite surprising for an intrinsically variable object, and the most likely explanation seems to be an amplification by a double lens (Alard et al., 1995). The possibility of observing microlensing by multiple lens, anticipated by Mao and Paczynski (1991), has already been put forward by the OGLE group (Udalski et al., 1994b) on candidate OGLE #7, and later confirmed independently by the MACHO collaboration (Alcock et al., 1995b).

The confirmation of the suspected candidates, with characteristic durations ranging from 3 to more than 60 days, will require scanning and reducing the whole stack of plates, including those taken in the U band, in particular to eliminate the possibility that these events are produced by dwarf novae (Della Valle 1994).

5. Variable Stars

Figure 2 displays a set of short-period variables which are representative of the variety of the new interesting objects detected in the DUO field.

Eclipsing binaries represent the dominant population among the variable stars discovered in the course of our survey. The most numerous are contact binaries with periods smaller than one day, followed by Algol-type objects and Beta-Lyr systems, this ranking being consistent with the results obtained by the OGLE group (Udalski et al., 1994a) on 116 eclipsing binaries discovered in the centre of the Baade's Window. The large number of eclipsing objects which will be produced by the DUO survey is expected to make possible statistical investigations of this population which has been only poorly studied up to the present time.

RR-Lyrae stars represent about 20% of the variable objects so far detected in the DUO field. These can be used to map the interstellar reddening, and are also good distance indicators. They are therefore invaluable in investigations of the structure of the Galactic bulge. The latter issue is of prime importance, in particular, for the study of the Bar. Although the existence of the Bar appears to be well established by now, its orientation and axis ratio are still poorly known.

This component of the galactic structure is receiving special attention from the groups involved in microlensing projects (see, e.g. Kiraga, 1994 and references therein, Stanek, 1995 , Zhao et al., 1995, and references therein). The optical depth to gravitational microlensing in the direction of the Galactic bulge appears to be in excess by a factor of 5–10 with respect to the previously expected values (see, e.g. Evans 1994 and references therein). This could be due to bulge-bulge gravitational amplifications, the Bar playing a major role in this process if oriented towards the Sun as proposed by several authors.

6. The Near Future

The reduction of the second half of the field is in progress. Additional observations will be necessary, especially to improve the time base line, as well as to increase the statistics of microlensing events, and for the study of the long-period variables. This is the reason why we have applied for a second run at the ESO Schmidt: IIIa plates and Kodak 4415 Tech Pan films will be taken on La Silla from May to August 1995.

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The Variation of Atmospheric Extinction at La Silla

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1. Introduction

A total of 248,000 stellar photometric measurements have been obtained from the Swiss station at La Silla from July 1977 to August 1994, during about 4400 nights of photometric quality. These seven-colour photometric measurements in the Geneva System (Golay, 1980; Rufener, 1988) have been obtained by using successively two telescopes (40 cm and 70 cm), two photo-electric photometers and one CCD camera, from two different locations on the site of La Silla.

A very homogeneous set of photometric data, and, in consequence, of data on Earth atmospheric extinction in the optical domain has been collected. A first analysis of the atmospheric extinction variations was published by Rufener (1986, hereafter Paper I) for the period from November 1975 to March 1985. The annual and long-term variations were described as well as the effect of the