PRELIMINARY TESTS FOR CCD OBSERVATIONS OF MUTUAL PHENOMENA IN BUCHAREST

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ABSTRACT. In the next observation campaign of mutual phenomena of Jupiter satellites, a Meade telescope with CCD will be used beside the other instruments already in function at Bucharest Observatory.The installation of the instrument began with different tests performed with the CCD camera. That includes laboratory tests, observations of stars and of planetary satellites. Different image acquisition and data storage software were used.

1.INTRODUCTION

1.1 Observations with small instruments

The occultation of Galilean satellites is easy to observe even with small telescopes (whose diameter is under 20"), because they are bright enough (mv ¡ 5), and the light flux acquired by the instrument during the event is sufficient for detection.

On the other hand, rapid observations performed with small instruments and sensitive CCD cameras avoid the image degradation due to atmospheric turbulence.In our case, the used telescope is a 10" f/10 Meade LX50. It is very bright despite its small aperture.

1.2 Characteristics of the used CCD

The CCD camera adapted to telescope for this purpose is a Mintron MTV12V1-Ex, acquired from Lechner TV. The chip is a 1/2" - line transfer SONY with 795x596 picture elements, very sensitive: 0.01 lux typical and 0.0001 lux in star light mode(126 frames added in 2.5 seconds).

Because of the great transfer rate of images, it is possible to build up the light curve of observed phenomenon, even in a short period of time (60 -100seconds).

1.3 The acquisition system

As we can see in figure 1, the whole system consist in:

- Telescope + CCD camera + computer;
- Time signals (UTC) obtained by time GPS receiver;

- PCI frame grabber +software
- Time acquisition card (CHRONO) +software ;

  Fig.1: The acquisition system

1.4 Filters used in observations

For long exposures, greater than 1second of time, it is necessary to be used filters, in order to avoid saturation. In our case, the presence of filter vas not necessary, because of short exposure times. With MTV12V1-Ex, at 0.04 seconds exposure time, both Jupiter and satellites can be easily detected.

However, in next future, we intend to introduce R filters to decrease the brightness of the sky.

1.5 Accurate timing of observation

The technical notes recommend that the observation be correctly related to the UT. The accepted error cans be estimated at 0.1- 0.2 seconds of time. That task is easy to accomplish, by correlating the computer intern clock with accurate UTC time signals received from a GPS. The correlation is done through a time acquisition card. The accuracy of acquired time signal is less than 1 ms.

2. OBSERVATIONS

2.1 The acquisition software

There have been used different software packages. Because the frame grabber is designed upon the BT878 chipset, all of them have to be compatible with VFW driver

2.2 The reduction software

Because the main goal of this kind of observations is the modeling of light curve, we tried some photometry software packages.

Preliminary studies were performed with Iris(Buil 2002), that seems to be good enough for our purposes.

References

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[4] MintronTV, 2002: MTV12V1-Technical notes

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