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THE AUTOMATIC MICRODENSITOMETER OF CÓRDOBA: CURRENT STATUS OF THE PROJECT

J. H. Calderón[1,2] and I. H. Bustos Fierro[1,3]

We present the description of a CCD based microdensitometer for astrometric measurement of photographic plates. We describe technical features and the current status of the project. This instrument is intended mainly to measure photographic plates of the Astrographic Catalog and Carte du Ciel collections of Córdoba Observatory.

The CCD-based microdensitometer was built using the main body of an old Hilger-Watts unidimensional scan microdensitometer as mechanical support. The original optical and illumination systems as the photomultipliers-based original detection system were removed. The original synchronous motor for moving the plate holder and the original analog electronics were taken away. The main body was just adapted in order to support the CCD camera enabling bidimensional movement and an automatically scanning of the whole plate (Fig. 1).

The main innovation was adapting a CCD camera in order to acquire the digital images of the plates. This is a Photometrics CH260 CCD camera with a scientific grade chip Thompson TH 7896 of 1024x1024 square pixels of 19 microns and 16 bits of digital resolution, cooled with liquid nitrogen. Data acquisition time for a single unbinned frame is about 60 sec.

The image of the zone of the plate to be digitized is projected on the CCD by means of a non telecentric multi-coating photographic objective optimized to work close to one to one magnification. By moving the camera nearer or away the plate it is possible to change the magnification and, therefore, the spacial sampling frequency. The plate is back-illuminated by a diffused light source. This source is a white screen illuminated by a red light emission diode. Typical exposure time is 100 ms.

Plates up to $16cm \times 16cm$ are supported by the plate-holder. The holder can be displaced in two coordinates by means of two step-motors, one for each coordinate, with a nominal displacement of 0.001mm by step of the motor. The movements are computer controlled. Different scan sequences can be programmed.

Fig. 1. Microdensitometer with the CCD camera attached.

Since the area covered by a single CCD frame is much smaller than a photographic plate, it is necessary to combine a mosaic of frames in order to measure the plate completely. This technique was previously evaluated by means of numerical simulations (Bustos Fierro, 1998). The results of a preliminary measurement performed by a prototype of the instrument were compared with the one made with the MAMA (Bustos Fierro and Calderón 2000) A detailed description of the measurement technique can be found in Bustos Fierro & Calderón (2003).

The construction of the instrument was finished and at present it is under evaluation and adjustment.

[1]Observatorio Astronómico, Universidad Nacional de Córdoba, Argentina.

[2]Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina.

[3]Agencia Córdoba Ciencia, S.E., Argentina.

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