Report on FOCA, a Balloon-Borne Ultraviolet Imaging Telescope

1. Introduction

About 70 square degrees, essentially at high galactic latitude, down to the UV magnitude 18 have been observed at 2000 Å with a balloon-borne, 40-cm aperture imaging telescope called FOCA (a brief description is given in Milliard et al., 1991). The field of view is 2.3 or 1.5 deg depending on the telescope focal length version; the corresponding angular resolution is 20 or 12 arcsec respectively. About two thirds of the nominal quality observations have now been processed resulting in a catalog which contains about ten thousand UV detections. At such an angular resolution the vast majority of detected objects look like point sources though they cover the variety of objects found at faint magnitudes (subluminous stars, galaxies and QSOs), whose B magnitudes can be fainter than 21 in the visible for the deepest images.

The next flight of the telescope is now scheduled for the spring of 1993, with a photon counting device as detector instead of today's intensifier plus film. Flights on a yearly basis are expected until 1996. A brief description of the results and the list of observations at nominal quality are given below.

2. A Brief Description of the First Results

Several areas so far have been investigated. Determination of the UV luminosity function of galaxy clusters (Donas et al., 1991) or field galaxy counts (Millliard et al., 1992); analysis of star formation in clusters of galaxies (Donas et al., 1990); hot evolved stars in globular clusters (Laget et al., 1992). All studies are based on the derived UV magnitudes supplemented by specialized catalogs in the visible to provide either a color index or additional information such as morphology, variability, redshift etc. which are of primary interest for interpreting the data. Cross-identifications with the GSC of the Hubble telescope, or other specific catalogs are performed by automatic position coincidences. We deal with a typical error box of a 2–4 arcsec which, at the observed density at high latitude ($B \leq 21$), is used to select the candidates. If in addition a color information is available, then the procedure becomes very reliable.

The list of the nominal quality observations at high galactic latitude is given below (FOCA ref. number, 1950 equatorial coordinates of the guide star near the field center, name).

3. On-going Development

An exciting and more pioneering aspect of the search and survey analysis is the identification of the numerous faint UV sources. They can presumably be stars, galaxies or QSOs whose B magnitudes can be fainter than 21 on the deepest images, and thus have no counterparts on the POSS-O prints. Understanding the nature of the faint UV detections would benefit most from cross-identifications in a catalog with a visible color, covering the field of view, and complete down to 21-22 B-magnitude for stellar and extended objects*. In a first approach, we plan to use the APS database from the digitized POSS-I (Pennington et al., 1991). POSS-II, when available, will presumably help at the faint end.

At the present stage, we take the opportunity of this newsletter to kindly ask the community for any deep-sky document like catalogs in numerical form, finding charts, working documents or prints of plates relevant to the listed fields.

---

*Fully in the scope of dedicated 2 m. telescopes equipped with mosaics of large CCDs, as suggested by R.W. West in Newsletter No. 1, p.7.

FOCA No	Alpha 50	Delta 50	Object
090	13 39 52.9	+28 37 38	M3
091	15 16 01.9	+02 15 51	M5
036	16 39 16.7	+36 17 46	M13
039	17 15 35.0	+43 11 21	M92
018	08 51 57.6	+78 20 18	NGC2715
033	11 59 04.1	+65 13 04	NGC4125
081	12 19 29.2	+47 27 34	NGC4258
071	12 18 16.7	+15 49 06	NGC4321
012	00 34 43.9	+40 03 27	M31
002	01 30 48.1	+30 08 00	M33
097	13 29 50.2	+47 29 28	M51
082	09 58 57.0	+69 01 41	M81-82
029	14 01 04.2	+54 54 21	M101
010	08 17 26.1	+20 54 26	Cancer clust.
067	11 42 45.5	+20 10 03	Abell 1367
034	12 26 02.3	+12 23 39	Virgo clust.
028	12 57 08.0	+28 20 06	Coma clust.
089	15 36 52.8	+34 50 13	Abell 2111
052	08 37 34.2	+46 00 39	S.A. 28
051	08 48 36.0	+43 54 51	S.A. 28
030	13 03 47.1	+29 17 48	S.A. 57
031	13 09 32.4	+28 07 52	S.A. 57

References

Donas, J., Buat, V., Milliard, B., Laget, M., 1990, *Ultraviolet observations of galaxies in nearby clusters. I. Star formation rate in spiral galaxies of Abell 1367*, Astronomy and Astrophysics, **235**, 60.

Donas, J., Milliard, B., Laget, M., 1991, *Ultraviolet observations of galaxies in nearby clusters. II. Luminosity function and surface density distribution in the Coma cluster*, Astronomy and Astrophysics, **252**, 487.

Laget, M., Burgarella, D., Milliard, B., Donas, J., 1992, *UV-(2000 Å) imaging of globular clusters. I. The projected radial distributions and counts of the blue horizontal-branch stars in M3, M5, M13 and M92*, Astronomy and Astrophysics, in press.

Milliard, B., Donas J., Laget M., 1991, *A 40-cm UV (2000 Å) balloon-borne imaging telescope: results and current work*, Advances in Space Research, **11**, 135.

Milliard, B., Donas, J., Laget, M., Armand, Ch., Vuillemin, A., 1992, *Galaxy counts at ultraviolet wavelengths (2000 Å)*, Astronomy and Astrophysics, **257**, 24.

Pennington, R.L., Humphreys, R.M., Zumach, W., Odewahn, S.C., 1990, *The Automated Plate Scanner Catalog of the Palomar Sky Survey — Astrometry and Photometry*, AAS Bulletin **22**, 1325.

B. Milliard, M. Laget and J. Donas
Lab. d'Astronomie Spatiale du CNRS
BP 8 - 13376 Marseille CEDEX 12
France

EARN/BITNET milliard or laget or donas @frlasm51
SPAN/DECNET 17579:: milliard or laget or donas