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SPACE ASTROMETRY AT 20TH MAGNITUDE

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ABSTRACT

The following pictures illustrate situations of very high star density, higher than that at galactic latitude b=0 deg, even when encountered in the combined field of view of a GAIA with beam combiner. It appears that source confusion with direct imaging in GAIA95C will be negligible even for 20 mag at b=0 deg. With fringe dispersion the source confusion will probably still be acceptable for such stars.

1. THE PICTURES

The pictures show 100 x 100 CCD pixels of Omega Cen and the LMC. For comparison, note that there are 55 stars per arcmin^2 with $V < 21.0$ at b=0, according to Allen AQ III. This means 110 stars per arcmin^2 in the combined field-of-view (FOV) of GAIA95C, or 0.0023 stars in the combined instantaneous field of view (IFOV) of a GAIA with beam combiner. The IFOV of GAIA95C with a baseline of 1.2 m and using direct imaging (without dispersed fringes) is 0.3 arcsec^2, i.e. about 2 pixels on the present pictures.

It appears from these numbers and is visualized by the pictures that the source confusing with direct imaging will be negligible at b=0 at 20th mag, and perhaps acceptable even in the centres of Omega Cen and the LMC.

If fringe dispersion is used the IFOV will be 7 times larger, according to G_CUO 01, Section 3.1. The source confusion is probably acceptable at 20th mag at b=0, but not in the centres of Omega Cen and the LMC.

1.1. Omega Centauri

Pictures in Johnson V and Gunn i are shown in Figures 1 and 2 where details of the exposures are given. The stars were found by iterative photometry with DAOphot using three iterations.

The corners of the field have coordinates as follows:

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 b          c
  ---------
  |        |
  |        |
  |        |
  ---------
 a          d
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corner	RA2000.(hh:mm:s)	DEC2000.(degs:':")
a	13:26:46.048	-47:28:24.420
b	13:26:45.916	-47:29:14.638
c	13:26:50.876	-47:29:15.883
d	13:26:51.007	-47:28:25.665

1.2. Large Magellanic Cloud

A picture in Strömgren y, corresponding to Johnson V is shown in Figure 3 where details of the exposure is given. The stars were found by iterative photometry with DAOphot using two iterations.

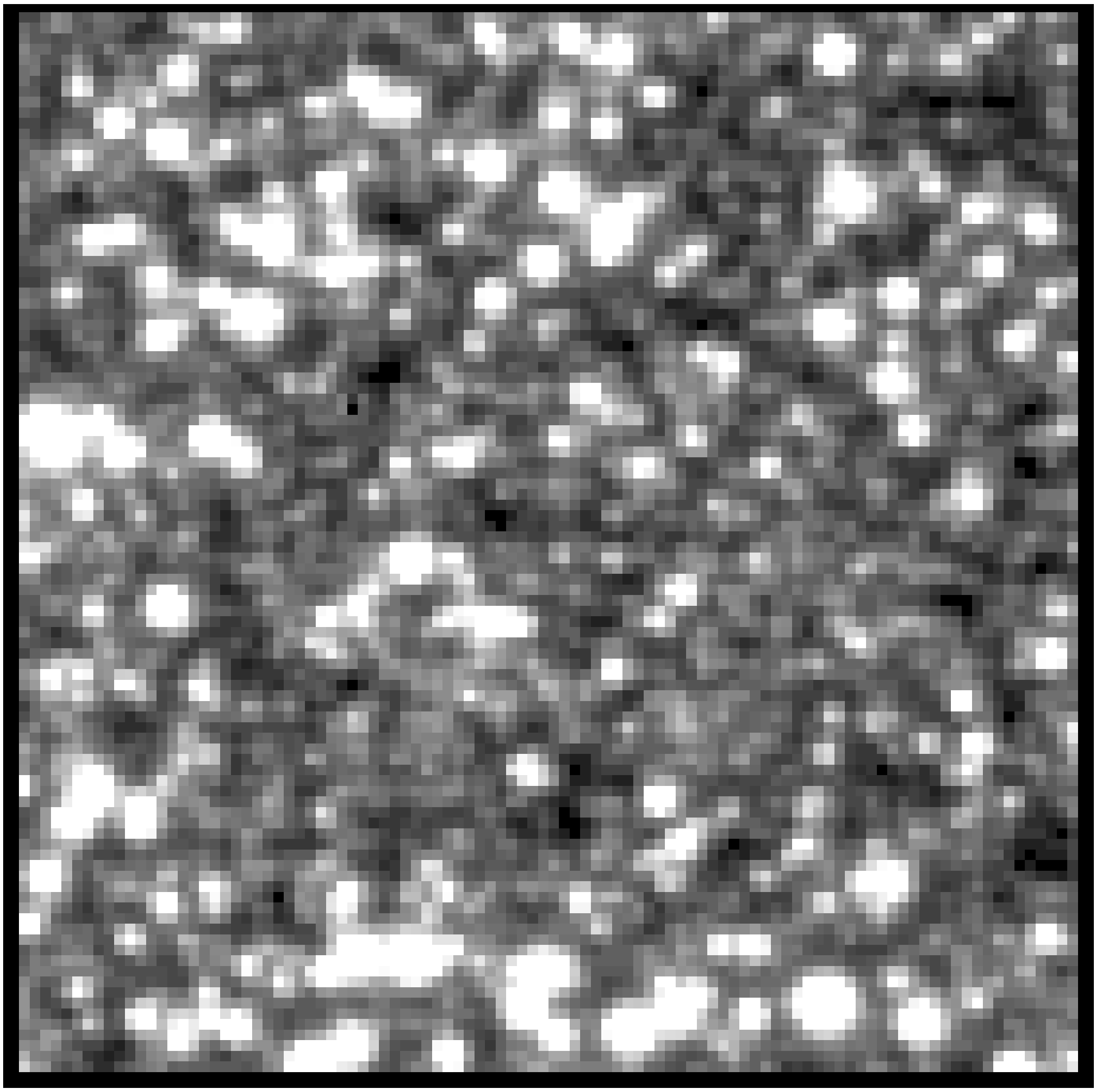

Figure 1. Colour band: Johnson V. A picture of 100x100 pixels = 51x51 arcsec^2 of the globular cluster Omega Cen. Exposure: 17 seconds with the Danish 1.5m on La Silla. Seeing: 1.8 pixel width, the optimal seeing. About 700 stars between V=13.0 and 21.0 mag have in fact been measured. This means 970 stars per arcmin^2.

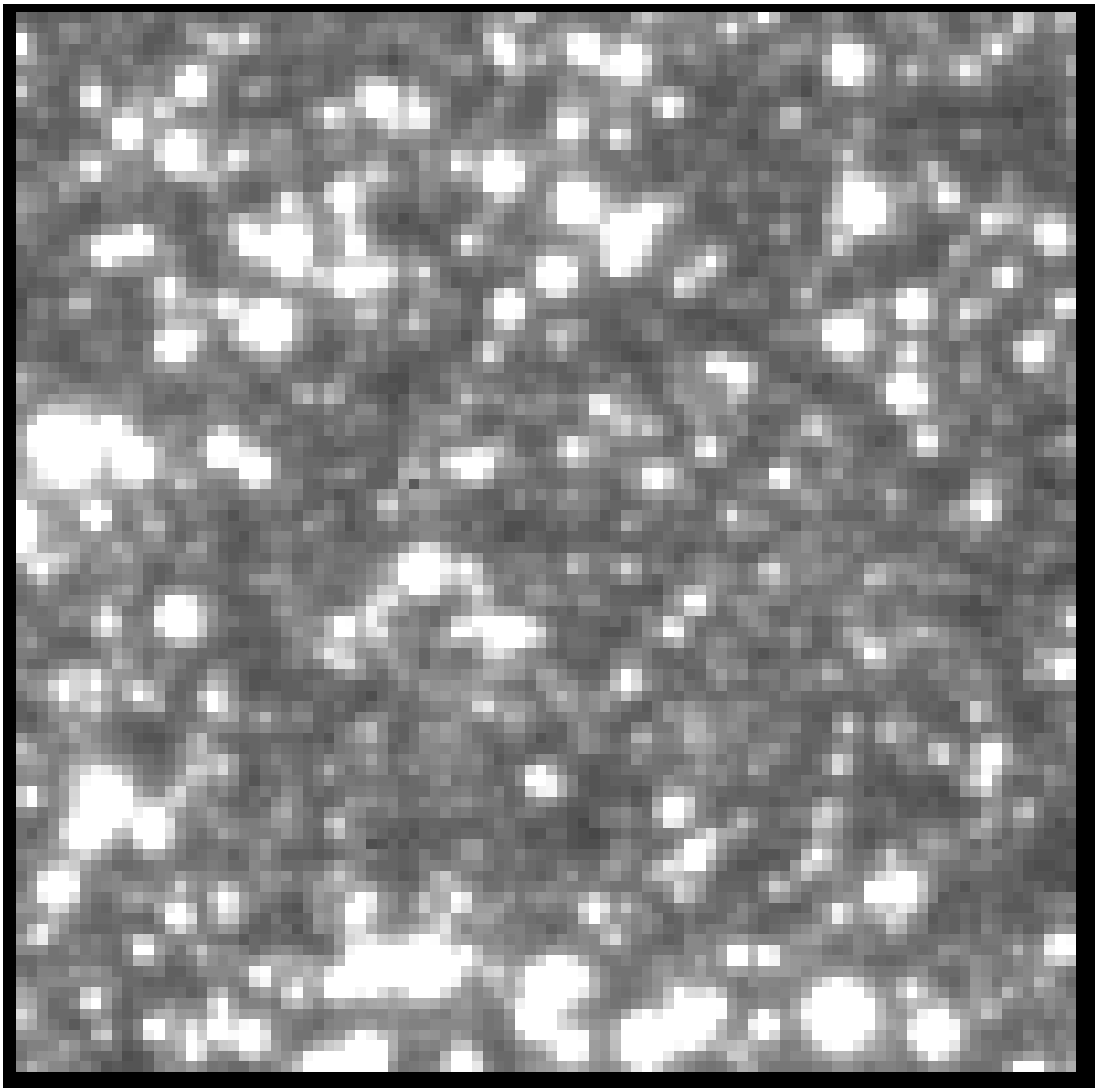

Figure 2. Colour band: Gunn i. A picture of 100x100 pixels = 51x51 arcsec^2 of the globular cluster Omega Cen. Exposure: 8 seconds with the Danish 1.5m on La Silla. Seeing: 1.8 pixel width, the optimal seeing. About 600 stars between i=12.7 and 20.7 mag have in fact been measured. This means 830 stars per arcmin^2.

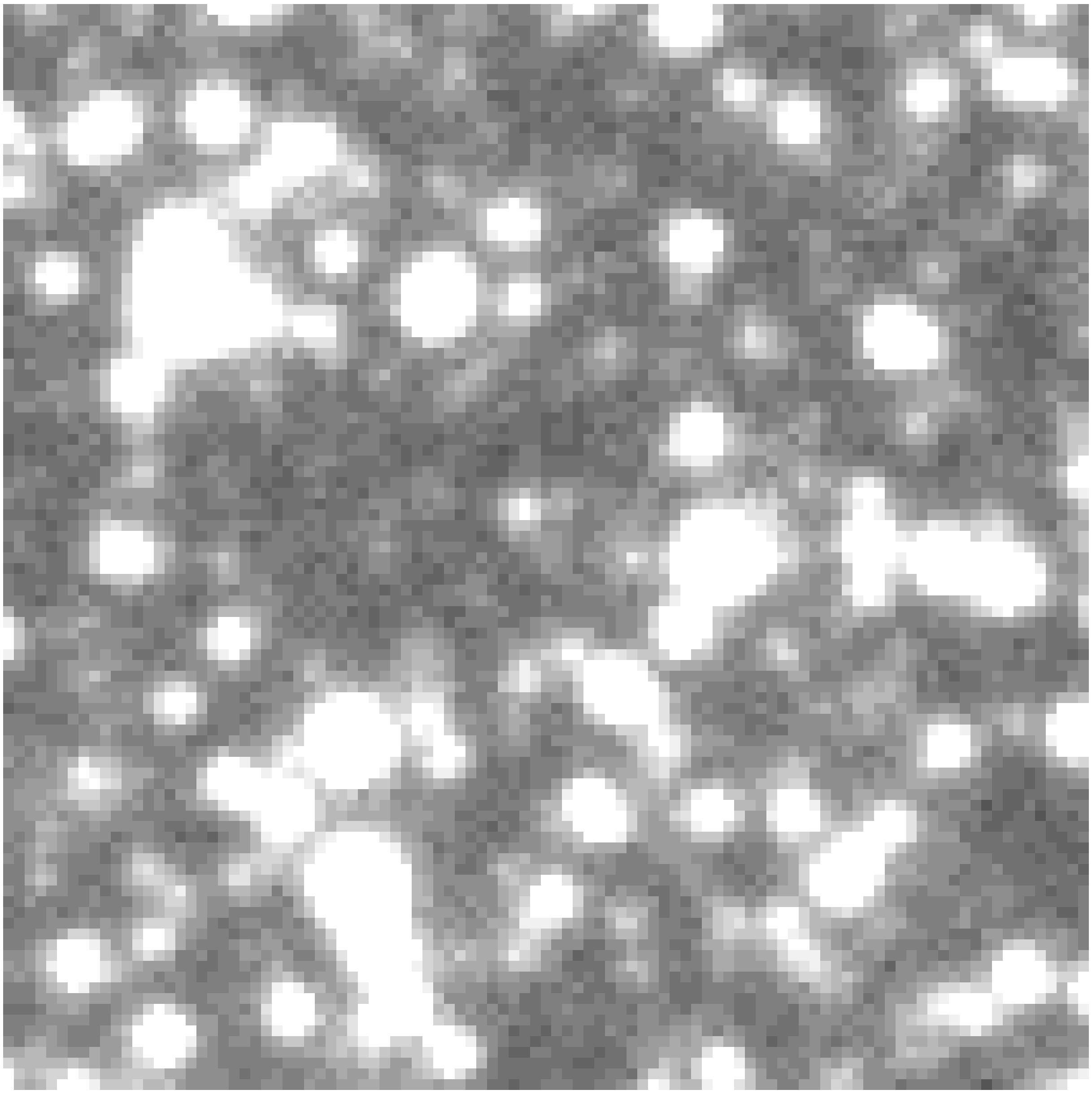

Figure 3. Colour band: y-Strömgren, corresponding to V. A picture of 100x100 pixels = 38x38 arcsec^2 of the LMC. Exposure: 48x2.5 min=120 min with the Danish 1.5m on La Silla. About 150 stars between V=16 and 22 mag have been measured. This means 370 stars per arcmin^2.