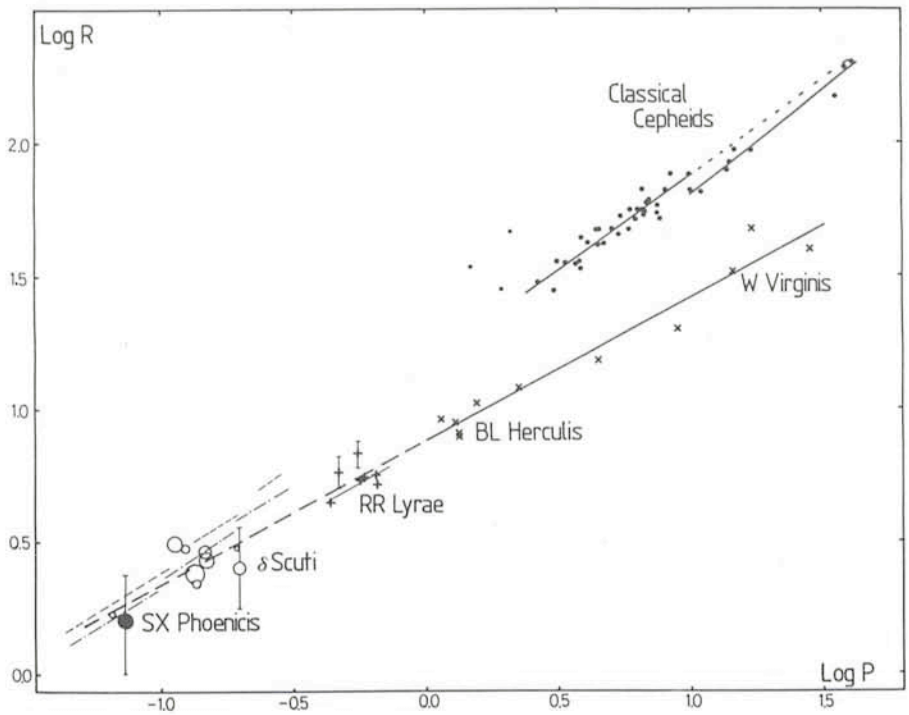

Figure 7: *The log R vs. log P diagram for six classes of pulsating stars. The 4 stars with error bars are RR Cet, DX Del, BS Aqr, and DY Peg (present work).*

ESO Information and Photographic Service

ESO has established a new service, which from now on handles the organization's public relations matters. It is located at the ESO Headquarters at Garching. It incorporates the functions of the former ESO Sky Atlas Laboratory and is directly attached to the Office of the Director General. The sale of conference proceedings, etc. will also be taken care of by this service.

The ESO Information and Photographic Service will inform the media and interested persons about events at ESO of general interest. These will include results of scientific research (in particular new discoveries) made at ESO's La Silla observatory, as well as technical matters in connection with ongoing telescope projects and auxiliary astronomical instrumentation. Major scientific meetings at ESO will also be covered.

The information will become available in the form of press releases and through the *Messenger*. It is the intention to organize Press Conferences whenever major events occur; members of the press will receive invitations in advance. Archival and current pictures, related to astronomical and other activities at ESO will be made available upon request. A catalogue is in preparation and will be announced in the June issue of the *Messenger*.

Members of the press, who would like to visit the ESO Headquarters in Garching must contact Mrs. E. Voelk (tel: (089) 320-06-276) at least one week in advance.

The Head of the ESO Information and Photographic Service is Dr. Richard M. West, a Danish astronomer who has been with ESO since 1970.

Performance Tests of DAOPHOT/INVENTORY Photometry Programmes in Dense Stellar Fields

S. ORTOLANI, Asiago Astrophysical Observatory, Italy

A comparative test of DAOPHOT and INVENTORY reduction programmes was performed at ESO Garching computer centre, in November 1985, on six frames of globular cluster fields obtained at the Danish 1.5-m telescope with the RCA CCD # 1. The scale is 0.″47 per pixel and the seing was almost constant around 1.″1–1.″3.

The comparison of the two programmes is based on three different tests:

(1) analysis of very dense stellar fields (centre of the globular cluster Pal 6); (2) analysis of very faint stars in a relatively clean field of NGC 7006; (3) comparison of the photometry in two V frames of NGC 7006.

For the first two cases the comparison is based on the quality of the resulting instrumental colour-magnitude diagrams, for the last one the frame-to-frame difference for each star is computed, and the standard deviation per magnitude interval is derived.

1. The Field of Pal 6

A couple of average B, V frames obtained from 2 V, 4-minute and 2 B, 20-minute exposures have been analyzed with INVENTORY and DAOPHOT. Figure 1 shows the approximately 110″ × 110″ region used for the comparison. 360 stars with a limiting magnitude of V~21 have been detected with INVENTORY and 300 with DAOPHOT. The average star density at V~21 is about 70 pixels per star rising at about 25 pixels per star in the 60″ × 60″ central region where most of the stars have been detected.

Figures 2 and 3 present the c-m diagram of Pal 6 obtained with INVENTORY and DAOPHOT respectively. In both plots a very red, diffuse giant branch is visible, with a possible horizontal branch at about 3 magnitudes below the giant tip. The diagrams are contaminated by the galactic background population, mostly in the blue part where a group of blue, bright stars is well defined. As demonstrated by the c-m diagrams of the field (Ortolani, unpublished data) they belong to the galactic field population. The upper part of the diagrams is comparable, but the scatter at the level of V~19.5 seems higher in INVENTORY than in DAOPHOT. The superiority of DAOPHOT in searching and centring the stars in the most crowded part of the cluster is also indicated by a visual inspection of the pictures.

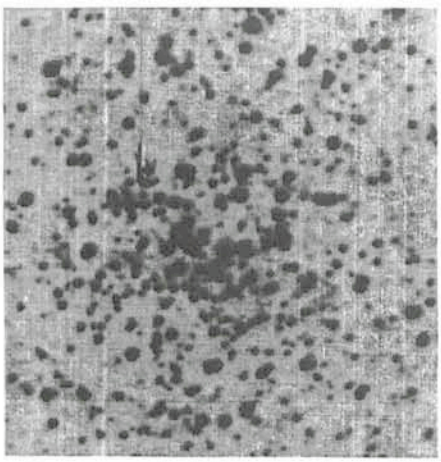

Figure 1: *V CCD image of the Pal 6 central region. The field is about 110" × 110", north is up and east to the right.*

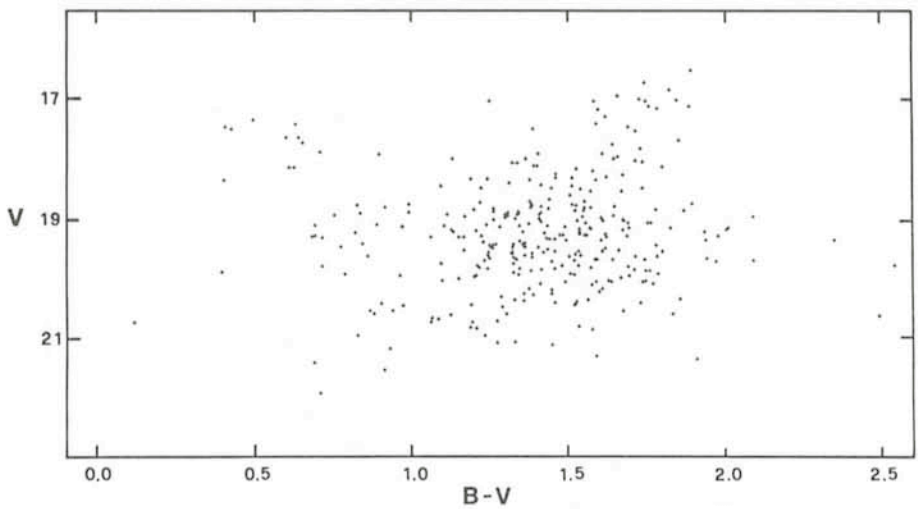

Figure 2: *Colour-magnitude diagram of Pal 6, obtained with INVENTORY. The zero point of the colour index is arbitrary.*

2. The Colour-Magnitude Diagram of NGC 7006

Figures 4 and 5 are the c-m diagrams of NGC 7006 respectively from INVENTORY and DAOPHOT. In both cases a selection of the stars with the best profiles has been done (see also Gratton and Ortolani, *Astron. Astrophys. Suppl.*, **57,** 177, 1984). The search and analysis have been forced to the lowest intensities in order to detect the main sequence of this distant cluster. The original frames (2V, 30-minute and 3B, 45-minute exposures) have been obtained during the same observing run of Pal 6. The central part of the cluster, overexposed, has been cancelled, covering the region with an area having a constant value.

Basically the two diagrams show the same features: a scattered, poorly defined giant branch (most of the stars are saturated), a horizontal branch with 3 variables, a subgiant branch, and a main-sequence turnoff at V~22.2

The INVENTORY diagram seems a little deeper and better defined in the proximity of the limiting magnitude (V~24). From the comparison of the original plots, fitting problems of DAOPHOT, at faint magnitudes, are evident.

It must be emphasized that INVENTORY magnitudes are simple aperture magnitudes, with a radius of 1.5 pixels, being better than the classical convoluted ones.

At present, DAOPHOT cannot give high quality aperture magnitudes, since the separation of blended images is performed only for convoluted magnitudes.

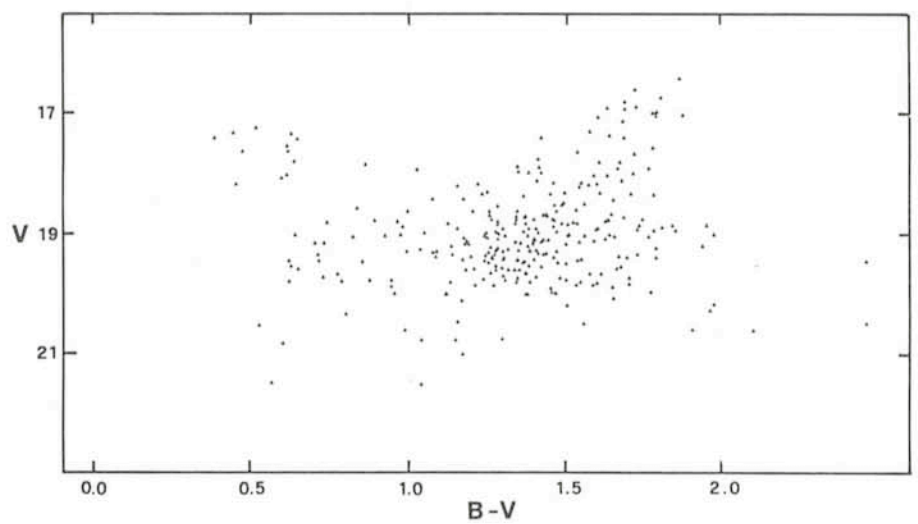

Figure 3: *The same as Figure 2, but obtained with DAOPHOT.*

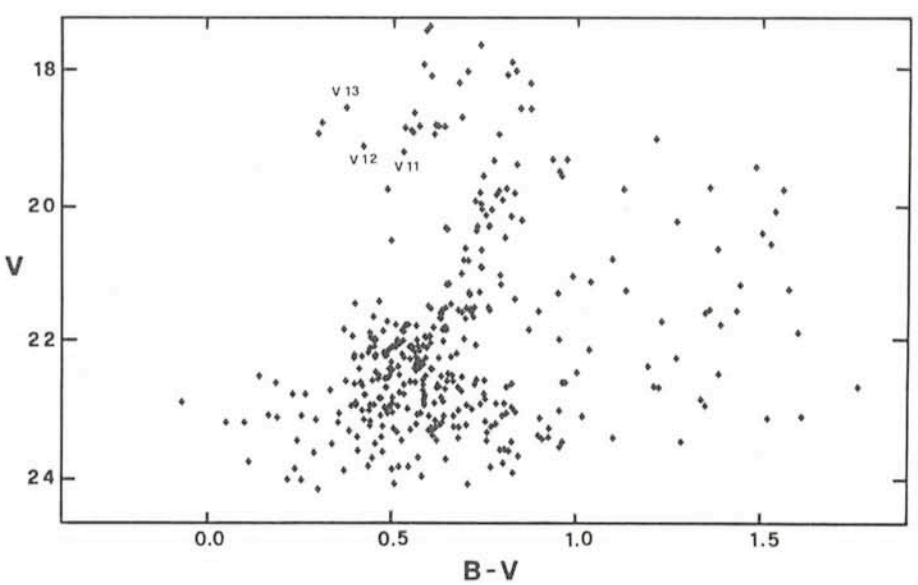

Figure 4: *Colour-magnitude diagram of NGC 7006 obtained with INVENTORY. Three RR Lyrae stars are identified.*

3. Frame-to-Frame Comparison

The two V images of NGC 7006 have been separately analyzed and the frame-to-frame resulting errors are plotted in Figures 6 and 7 for INVENTORY and DAOPHOT respectively. They show an analogous scatter, confirmed by the standard deviations computed per magnitude interval. INVENTORY gives, at V = 17.5, 19.5, 20.5, 21.5, 22.5, respec-

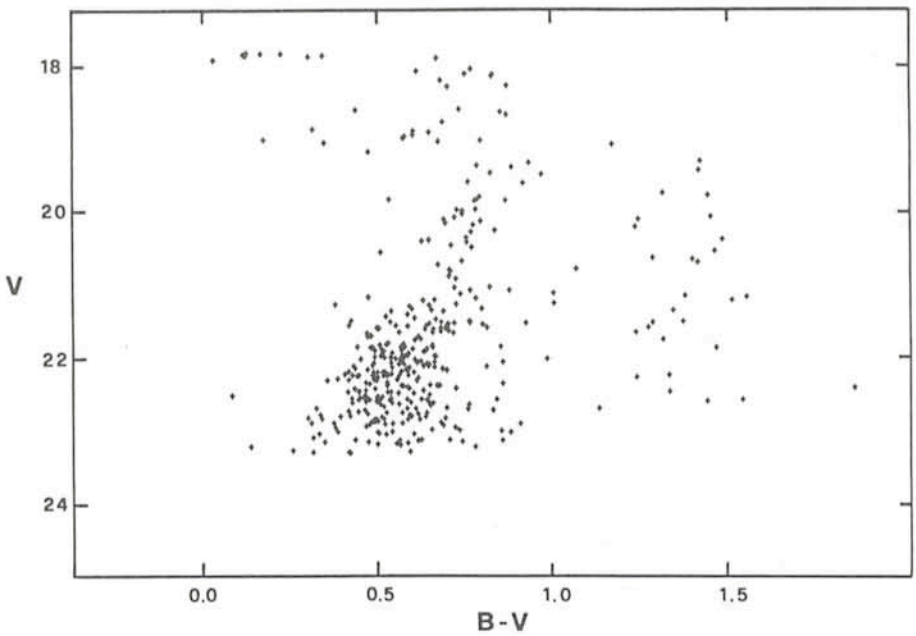

Figure 5: *Colour-magnitude diagram of NGC 7006 obtained with DAOPHOT.*

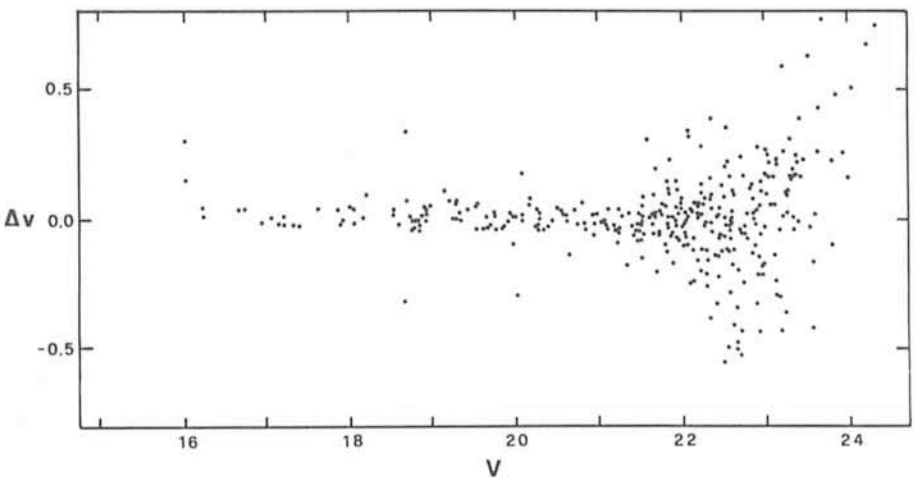

Figure 6: *INVENTORY frame-to-frame errors plotted against the visual magnitude.*

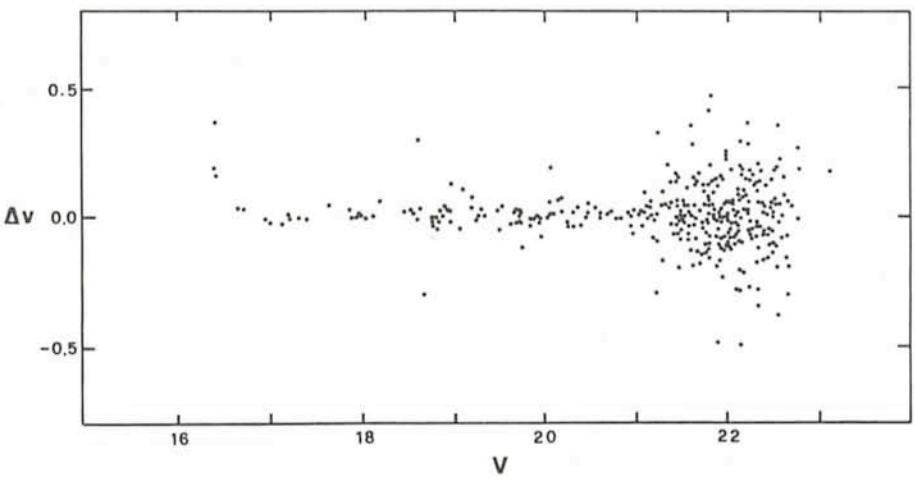

Figure 7: *The same as Figure 6, but from DAOPHOT analysis.*

tively .03, .03, .04, .07, .08, .18 magnitudes. DAOPHOT gives .02, .03, .04, .04, .12, ~.18.

These errors take into account blend, centring problems, noise and deviations due to defects of the chip. They are higher than the photon statistics error alone, but are about three times smaller than the correspondent aperture magnitude measurements of IHAP or MIDAS.

The execution time of the search and analysis of the ~1,000 + 1,000 stars in the 510 × 305 pixel frames was recorded during the night of November 17. 50 minutes were timed for DAOPHOT (this includes many dead times due to interactive inputs at the terminal), compared to about 40 minutes for INVENTORY (the preliminary normalization procedure is included). No unexpected problems were undergone during the execution, nor other users affected during the measured time.

In conclusion DAOPHOT seems more specific for stellar photometry, superior to INVENTORY in very crowded fields. On the other hand, INVENTORY is more flexible, permitting the measurements of both stars and diffuse objects, and it also gives many parameters (21) per detected object, useful for detailed analysis of single, peculiar objects. It is also a little faster. The possibility to use, in DAOPHOT, some very useful routines for the subtraction or addition of stars, fundamental for the discussion of the searching completeness and photometric accuracy, must be emphasized. Therefore, at present, an appropriate combination of the two programmes seems to be the best solution. This report presents only preliminary results. A more accurate comparison, obtained from optimized analysis, is in preparation.

Acknowledgements

We are indebted to J. Melnick for explanations and preparations of useful table and image conversion programmes from DAOPHOT to MIDAS. We are also very grateful to the ESO staff for helping us during the reduction of the data, in particular to A. Lauberts who permitted us to use his excellent PAIR programme.

ESO Book in Preparation

Under the working title "An Outlook to the Southern Sky", a pictorial book showing the most spectacular celestial objects in the southern sky is in the final phases of preparation. The main authors are Svend Laustsen and Claus Madsen. Dr. Laustsen, who is lecturer at the Aarhus University, Denmark, was also the manager of the ESO 3.6-metre telescope project. Mr. Madsen is Scientific Photographer at the ESO Information and Photographic Service at the ESO Headquarters in Garching.