asymmetric. The asymmetry seems too wide in size to be due to the emission of a cold companion, but could be accounted for by the presence of a planet on a slightly excentric orbit, able to generate arc-like structures in the dust disk (Roque et al., in press). The other possible dust trace generated by a planet, a void of matter, is not apparent on Figure 1. But the brightness of the disk seen on Figure 1 is (schematically) the result of 2 parameters: the dust density number and the dust temperature. Modelling the dust temperature, we found a temperature induced brightness gradient steeper than observed, so that a deficiency of matter towards the star is needed, even if the brightness is still increasing (Lagage and Pantin, submitted).

Note that thanks to the Richardson-Lucy deconvolution algorithm, we were able to resolve the disk structure at the level of one pixel. That means that a better sampling of the diffraction pattern would make sense. An improvement in this direction could be easily achieved by upgrading TIMMI with the new 128×192 Si:Ga detector array under manufacturing at the LETI/LIR (Lucas et al., in press) and whose pixel size will be of $75 \times 75 \mu m^2$, instead of $100 \times 100 \mu m^2$ for the actual detectors. Note also that the reference for the point spread function has to be taken not too far away from the object, because the aberrations (decentring coma . . .) of the 3.6-m telescope in the f/36 configuration, of the order of 1″, depends on the telescope position (Gilliotte, private communication).

Another promising candidate to image in the MIR is 51 Oph. Indeed, the 10 μm emission from this object is large (10 Jy) and almost entirely due to thermal radiation of dust (Coté and Waters 1987). Furthermore, from similarities between the gaseous optical and ultraviolet lines detected around β-Pic and 51 Oph, it was concluded that the 51 Oph dust was probably in a disk-line structure seen edge-on, like the β-Pic structure (Lagrange-Henri et al. 1990, Grady et al. 1993), which makes the detection easier. But the object has the disadvantage of being far away from us (70 pc). Nevertheless, given the size of the β-Pic disk observed, it was worthwhile trying to image the 51 Oph dust. The observations were conducted in June 1993. After data analysis, we were able to image a dust envelope . . . but that of α-Sco, the reference star! This observation is encouraging for the programmes aiming at studying the dust around late-type stars (Mékarnia, private communication); but this is another subject. Fortunately, we always observe two reference stars; the second reference star was point-like. Oph 51 also appears point-like; nevertheless, the negative result led to interesting constraints on dust disk models (Pantin and Lagage, in preparation).

We have now observed all the few main-sequence stars of the southern hemisphere with a large 10 μm excess. (The last data, obtained in December 1993, are not yet fully reduced). We are now observing stars with a much fainter excess, but which are nearby, so that we can still expect a detection. However, for two reasons the best window for detecting new disks is not the 10 μm window, but the 20 μm window, even though it has a poorer atmospheric transmission than the 10 μm window: first, most of the star disk candidates exhibit a sizeable excess only beyond 10 μm (Aumann and Probst, 1991); second, the 20 μm radiation is emitted by grains twice cooler than the grains detected at 10 μm; these grains are at least 4 times more distant from the star, which is more than enough to compensate for the loss in diffraction-limited angular resolution. The 17 μm channel of TIMMI, with a sensitivity more than an order of magnitude worse than expected for a good 20 μm camera, is of no help for the kind of programmes discussed here. The weather conditions at La Silla may not be good enough to justify an ESO investment in a 20 μm camera. On the contrary, Paranal is a promising site for 20 μm observations, so that a 20 μm channel is an indispensable complement to the 10 μm channel of the Mid-Infrared instrument under study for the VLT. We can anticipate a large use of this window for all the programmes dealing with dust around stars, whatever their evolutionary stage: young, main-sequence or late-type.

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NTT Observations of Obscured Globular Clusters

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The bulge of our Galaxy contains a number of globular clusters hardly observable due to the high obscuration close to the direction of the Galactic centre. At the Galactic plane, the extinction may amount to more than $A_V=30$ magnitudes. A few clusters and fields located in regions of low extinction (or "windows"), such as the Baade Window, have been known for some time and can be easily observed. More recently, however, a number of very ob-

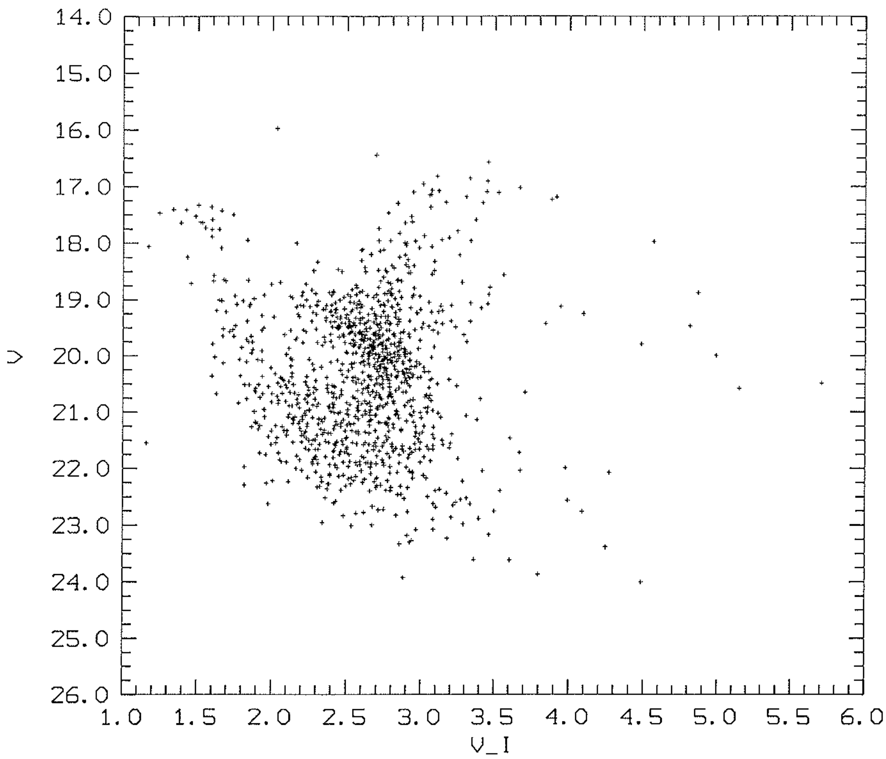

Figure 1: *V vs (V-I) Colour-magnitude diagram for Palomar 6.*

scured clusters could be identified, and colour-magnitude diagrams (CMDs) can be built using near infrared bands like, e.g., I and Gunn z (which are less affected by interstellar reddening) combined to sophisticated technology available at the NTT. The study of these clusters is important because they are possible tracers of the bulge population.

Such is the case of Liller 1, a very obscured globular cluster, discovered by Liller (1977) as the optical counterpart of the X-ray source MXB 1730-33. It is seen projected very near to the galactic centre direction at galactic coordinates l=354.81°, b=−0.16° and an inspection of the ESO R plates shows that it is among the faintest known globular clusters or globular cluster candidates in the Galaxy.

Another example is shown in Figure 1, where the V vs (V-I) CMD for Palomar 6 is shown, to be compared with a previous diagram obtained by Ortolani (1986) from observations with the Danish 1.5-m telescope. Using the NTT telescope, we could reach the giant branch and horizontal branch of this cluster (at V=19.7 and V-I=2.7), while only the red giant can barely be seen in the previous diagram.

The new observations were made at the red arm of EMMI. A LORAL front-illuminated CCD (ESO # 34) with a pixel size of 15 μm (0.35″) was used. The CCD array has 2048×2048 pixels, from which only the central 500×500 were extracted and reduced. Notice the improved quality of the new results. The photometric quality is better and the diagram deeper. This is due mainly to the high optical quality of the NTT images, even if the seeing at the time of the observations of Pal 6 was not excellent (around 1″ FWHM). This is, however, much better than our previous 1.6″ best value obtained at the Danish telescope. Also the reduction techniques contribute to the improved results. The relatively new Daophot II and Allstar codes, installed in Midas in 1991, were used for our new fields. These reduction programmes are much better than the "old" Daophot I, mainly because of the more accurate treatment of the mathematical deconvolution of crowded stellar images and the improved point spread function (which is the mathematical function of the stellar shape). From the features of our new diagram it can now be verified that Pal 6 is in the class of bulge metal-rich globular clusters (Ortolani et al. 1990, 1992). Pal 6 has a reddening $A_V \approx 4.3$ magnitudes and can be studied in the V band.

Liller 1 was observed during the same observing run and reduced with the same technique. It is so heavily obscured that its brightest giants are at the detection limit in V. Clearly, for this kind of globular clusters, the observations must be shifted to bands farther in the red. Indeed we have been able to study the CMD of Liller 1 in I and Gunn z with the NTT and the above-described equipment. The results are shown in Figure 2 for a circular extraction of r < 35″ centred on Liller 1. The z magnitudes are instrumental. The giant branch is clearly detected and the CMD reaches the horizontal branch level at I=19.9. The giant branch indicates a very metal-rich cluster, because

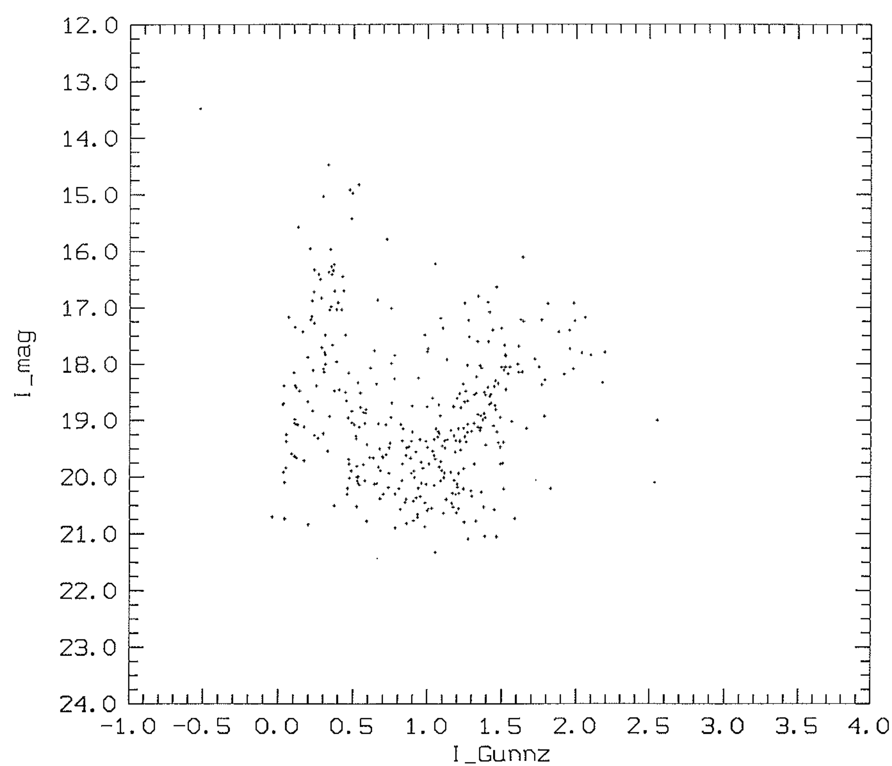

Figure 2: *I vs (I-z) Colour-magnitude diagram for a circular extraction of r < 35″ centred on Liller 1. The z magnitudes are instrumental.*

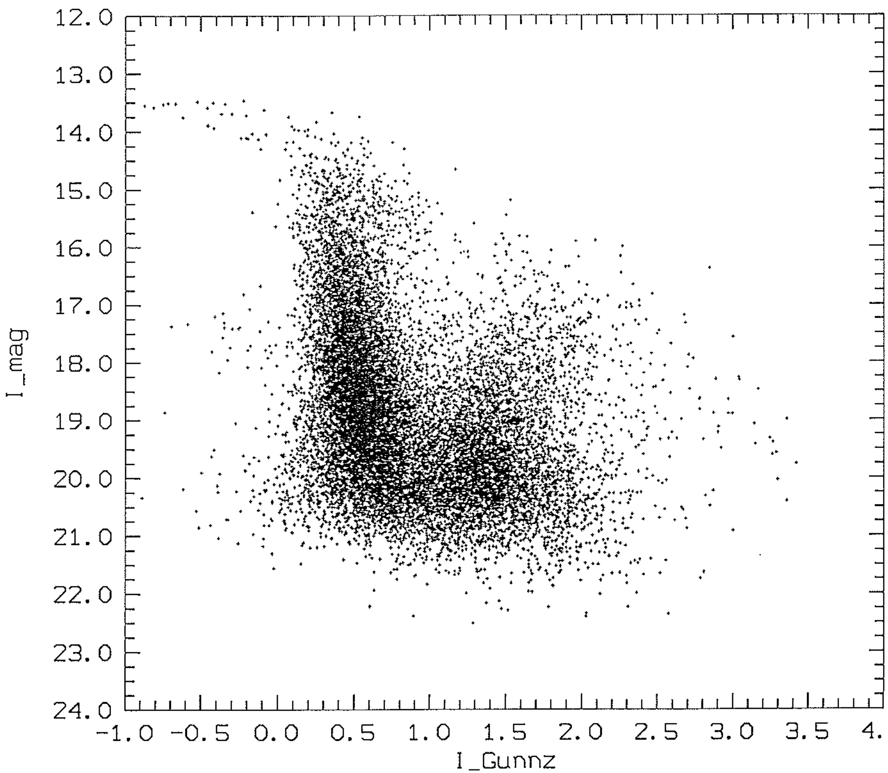

Figure 3: *Colour-magnitude diagram for the field near Liller 1, of size ~ 10′×8′ containing 20,000 stars.*

metallicity effects are seen also in these near-infrared bands, which otherwise are little affected by blanketing in less metal-rich clusters.

Another important result can be seen in Figure 3 where we show the CMD for the whole field of size ~ 10′×8′ containing about 20,000 stars, which is provided by the present equipment. In addition to the strong main sequence, the bulge field GB and HB are observed. Note the similarity of the latter component, in terms of values and morphology, to Liller 1. We conclude from this similarity that Liller 1 is located at the distance of the bulge bulk stellar population (close to the Galactic centre) and present similar metallicity. An interesting future project would be high-resolution spectroscopy of giant members for better metallicity determination of stars in the inner bulge. As such stars have I ≈ 18 magnitudes, one clearly will need telescope apertures such as that of the VLT. New, direct image observations in the cores of these clusters are also planned with the WFPCII of Space Telescope.

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Fine Structure in the Early-Type Components in Mixed Pairs of Galaxies

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Elliptical galaxies were once viewed as the simplest of the forms assumed by stellar aggregates in the universe. Many observational discoveries in the past 15 years have altered this simple viewpoint. Both kinematic and morphological complexities are rapidly becoming the rule rather than the exception when ellipticals are studied closely. We describe here a new observational study of fine structure in elliptical members of binary galaxy systems. The structure is not always obvious in raw images because the smooth contribution from the stellar component is so strong. We consider techniques for enhancing these clues into the structure and evolutionary history of elliptical galaxies.

I. Introduction

One of the competing explanations for the origin of (many or all) elliptical galaxies views them as merger products. Fine structure, such as the shells, ripples and X-structure observed in many ellipticals, is considered by some as evidence for merging/accretion events. An objective definition of what constitutes a merger product must await a better understanding of the phenomenon and its frequency of occurrence. Even allowing for a large uncertainty in the numbers, it seems that a link exists between observed fine structure and other suspected signatures of past interaction, such as kinematically decoupled cores, unusual UBV colours and X-ray emission.

We are interested in the structure of E/S0 galaxies that are paired with spiral galaxies in so-called mixed morphology pairs. The existence of physical pairs of mixed type was questioned until recent optical and FIR studies showed that considerable numbers must exist. We are interested in comparing the properties of galaxies in such pairs with isolated galaxies of similar morphological type. We are searching for evidence that the morphology difference of galaxies in mixed pairs might be due to secular evolutionary effects related to periodic encounters with the close companion. If many of the structural peculiarities now