the CCD dewar entrance window and the surface of the CCD itself. The most obvious spurious reflections in WFI images are out-of-focus ghost images of bright stars (Fig. 5). The effect is at least partly filter-dependent – multiple reflections are much more prevalent in the Hα and [S II] narrow-band filters compared to other narrow-bands or *U B V R I.* Individual ghost reflections in *B V R I* contain 1.5 to 2% of the unreflected starlight; the reflections in Hα and [S II] are even stronger than the others because the first reflection is nearer to focus, and the light more concentrated, even though the total reflected content is virtually the same. Removing these ghosts from sky frames is somewhat problematic, since the offset between ghost and object varies symmetrically with object distance from the optical axis. Hence, telescope dithering and median-filtering strategies such as those described in Jones, Shopbell & Bland-Hawthorn (2001) are not effective.

Ghost reflections are just one contributor to stray illumination in the flat-field. Other components such as diffuse scattered light (across the full field), focal concentration and side illumination also contribute, giving rise to flat-field errors discussed earlier. These are not as readily identifiable as the ghosts, and so at best, the observer needs to correct for their influence through the offset technique described above. The bottom line is that the combined contribution is more than a few per cent, and observers desirous of photometric precision better than a few per cent need to correct for these effects.

Conclusions

Considering the field size of the WFI camera, the flat-field errors are not unusually large. This bears testimony to the quality of the optics. However, for many observers, the amplitude of the effect might come as a surprise since it is often claimed in the literature that cameras in general can be flat-fielded to within a few millimagnitudes (particularly when using median filtered night-sky frames as super-flat calibration). A perfect calibration should *not* leave a flat sky background if the illumination at the detector plane is not uniform, hence this should not be considered as a valid test of the achieved accuracy. We have shown that if we use just the standard flat-field correction, the achievable accuracy is of the order of 5%. Nevertheless, this number does not contain the whole truth because the same star placed at different parts of the mosaic could show systematic variations in its measured brightness of almost 10% peak-to-valley. This is quite devastating for programmes that attempt to find spatial correlations in quantities directly derivable from the fluxes. Thankfully, the colours appear to be much less affected.

One may wonder why such errors are rarely accounted for. It is simply not easy to detect the 2-D effect unless you specifically look for it, and have suitable dithered frames to analyse. It is reassuring to see that with the proper procedures the systematic errors can be reduced down to 1%.

Because of a fast readout and the large area – hence, the large number of measurements per frame – WFI observations can easily include the dithered exposures needed for computing the calibration correction. This procedure will still be easier when accurate wide-field standard fields are available.

References

Andersen M.I., Freyhammer L., Storm J., 1995, in "Calibrating and understanding HST and ESO instruments", Ed. P. Benvenuti, ESO Conference and Workshop Proceeding No. **53**, 87.

Jones, D. H., Shopbell, P. L., Bland-Hawthorn, J., 2001, *MNRAS*, submitted (http://www.sc.eso.org/hjones/WWWpubl/detect meas.ps.gz).

Jones, D.H. and the 2p2 Team, 2000, "Inspection of Flatfields from the Decontamination Monitoring Programme" (http: //www.ls.eso.org/lasilla/Telescopes/2p2T/E2p2M/WFI/documents/Decontam/FFofWFI.ps.gz.

Manfroid J., 1995, *A&AS*, **113**, 587.

Manfroid J., 1996, *A&AS*, **118**, 391.

Manfroid, J., Royer, P., Rauw, G., Gosset, E. 2001, in Astronomical Data Analysis Software and Systems X, ASP Conferences Series, in print.

Selman, F. J., 2001, "Determining a zero-point variation map for the WFI." (http: //www.ls.eso.org/lasilla/Telescopes/2p2T/E2p2M/WFI/zeropoints).

Stilburn, J., 2000, in "Optical and IR Telescope Instrumentation and Detectors" Eds. M. Iye and A. F. M. Moorwood, Proc SPIE 4008.

SCISOFT – a Collection of Astronomical Software for ESO Users

R. HOOK, ST-ECF

There are active astronomers, visitors and students at all four ESO sites who need a wide variety of software to work efficiently. Much of this scientific software has been developed in the community and is not normally used in non-astronomical establishments. Examples are software to reduce, display, analyse and visualise astronomical data.

If there is no co-ordination, there is a strong tendency for such software to be installed at the different sites only when requests come from users and there is no simple way, or enough human resources, to make updates or ensure compatibility between sites. As a result it was common for visitors to ESO sites to be unsure what software they could expect to be available and in the case of offline data manipulation at the telescope such uncertainty could lead to inconvenience and possibly inefficient use of observing time.

To try to avoid these problems the Scisoft project was established at the beginning of 2000. It is a joint effort between the author from the ST-ECF, the ESO scientific community represented by an advisory board with delegates from each ESO site, and the ESO IT group which is part of the Technology Division. Recently, the Data Management and Operations Division has also become an active member by supporting external distribution.

Scisoft maintains a uniform, documented and tested collection of software for the three main ESO computer platforms – Solaris, HP-UX and Linux – and makes regular distributions internally on CD-ROM. This collection is the standard one for users and visitors at all four sites. It is also distributed from Garching to Chile using mirroring so that updates propagate automatically. The items included on the three platforms are close to identical. At each release the policy is to have only one version of each package, the most recent available. Installing a single collection takes far less effort than locating and installing many individual items and testing them and hence leads to a major reduction in the total effort required for scientific software support throughout ESO.

The content of the collection is driven by the needs of ESO users which are expressed by representatives of all four ESO sites at a board meeting before each new release. At present the collection contains IRAF with many layered packages, ESO-MIDAS, Eclipse (for ISAAC and other data), IDL (although a license must be bought to allow full operation, not just the demo mode), GILDAS, Difmap, Terapix tools including SExtractor, image display programmes such as Skycat, ds9, SAOimage, ximtool, etc, and many other things. A full list is available at http://www.eso.org/scisoft. Anyone planning observing at an ESO telescope in Chile can expect to find this collection on site for their immediate off-line data analysis. The contents are biased towards the needs of the ESO optical and near-IR communities so, for example, there is no X-ray software included.

Although some ESO software items (ESO-MIDAS, Eclipse and Skycat for example) are included in Scisoft, most are not as they typically are linked to other deadlines such as proposal submission and maintained and supported independently. These items should be obtained via the ESO web pages as at present.

Scisoft releases occur at approximately six-monthly intervals and there have so far been two, in June and November 2000. The next one will be in July 2001. Originally, this collection was just intended for internal ESO use but in spring 2001 it was decided to also allow external distribution without support.

Although now available to external users, it is intended that the Scisoft collection will remain focused on the ESO internal needs and will develop accordingly. Nevertheless, we are interested in hearing comments from the external community.

The external ("EXPORT") version lacks some of the items in the internal version because of copyright questions but is otherwise close to identical. Anyone wishing to request a copy is encouraged to send their postal address and the name of the version they would like to receive (Linux, Solaris or HP-UX) to "scisoft_request@eso.org" and we will post them a CD (see picture at right of title).

LATEST NEWS

ESO High-Level Presentation in Porto

C. MADSEN, ESO

In connection with the meeting of the ESO Council in Porto on June 18–19, ESO invited a number of representatives from important groups in Portuguese society, including academia, industry, politics and the media for a presentation at the Centre for Astrophysics of the University of Porto (CAUP). At the meeting, presentations were given by the Portuguese Minister for Science and Technology, Prof. J.M. Gago, the ESO Council President, Dr. Arno Freytag, the Director General of ESO, Dr. Cathrine Cesarsky, Prof. Teresa Lago, Head of CAUP and Portuguese delegate to the ESO Council, and finally Dr. João Alves, ESO. This was followed by a live video conference with Paranal, where Damien Hutsemékers discussed current observations done with the VLT telescope ANTU. A cocktail and a short planetarium show completed the event, which also marked ESO's first public appearance in Portugal since the formal accession of this country to ESO. ESO will continue its high-level presentations in its member states with the next event planned to take place in Brussels in November this year, at the time of the Belgian EU Presidency.

Prof. Gago's speech about the development of science in Portugal and the importance of international collaboration drew great applause among the invited guests.