o = 0.47 (cold diaphragm occultation)

$u = \frac{\lambda}{D}$ [pixel units] D = primary mirror diameter.

2. Diffraction theory indicates that for a *perfect* PSF, with a Strehl Ratio of 1, and without any central occultation, 84% of the energy is in the central core, i.e. within 2.44 FWHM diameter, 45.6% within the core FWHM diameter. When an adaptive optics servo-loop is aiming at diffraction-limited images, residual errors are present which leave higher energies in the surrounding halo of the long-exposure PSF, and less energy in the central core: when the Strehl ratio is less than 1, the energy is spread on more pixels. Therefore, we calculate the limiting magnitude for a significant Strehl ratio, based on our experience.

We calculate the limiting magnitude for a given sampling and a given Strehl ratio, but not as a function of the FWHM which is not the relevant information for such an estimation: for a Strehl ratio of about 30 %, the FWHM is the same as the Airy pattern of the instrument, but the image is not the theoretical one, as the correction can still be improved.

Assuming that, we estimate the equivalent magnitude of the star as:

$$m_{lim}[Mag] = NEM + \Delta m_{sampling} + 2.5 \log(Strehl)$$

where

$$\Delta m_{sampling} = 2.5 \log 0.74 + 2.5 \log DDC$$

4.2.3 Extended sources

For an extended source, we need to scale the NEM to the pixel size, taking into account the filling factor:

$$m_{lim}[Mag/arcsec^2] = NEM + \Delta m_{sampling} + 2.5 \log(Pix_{scale})^2 [arcsec^2]$$

where

$$\Delta m_{sampling} = 2.5 \log 0.74$$

5. Conclusion

The main characteristics of the COMIC detector, as measured during the acceptance tests in Meudon and during the commissioning run in November 1995 show that this camera, in conjunction with the adaptive optics system ADONIS, is fully adapted to imaging operation in the 1–5 µm spectral band. The large dynamic range of the detector allows long exposure time imaging at all wavelengths, which is possible regarding the good quality of the images provided by the adaptive optics system. A new software, including real-time facilities such as shift-and-add, dead pixels removal, sky subtraction and flat fielding, statistics (S/N, histogram, diaphragm photometry), 3D view, zoom, one pixel versus time, batch sequences, automatic log-book, ..., allows the astronomers to evaluate and improve in real time the scientific output of their observations.

The first astronomical object observed with COMIC, the bright ($M_v = 5.40$) solar type star 51 Pegasus, clearly demonstrates the excellent imaging quality of ADONIS with the COMIC camera (see *The Messenger* No. 82, December 1995). The Figure 3 clearly demonstrates the excellent imaging quality of ADONIS with the COMIC camera, on the star HR 8720: the Strehl ratio is up to 60%, and the diffraction limit is achieved, in the M band, under a median seeing condition (not better than 1.5″).

Additional information is available on the ESO WEB site where under Adaptive Optics/Adonis there is an updated description of the instrumentation: www.hq.eso.org/aot/adonis/adonis.html#comic

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OTHER ASTRONOMICAL NEWS

5th ESO/OHP Summer School in Astrophysical Observations

Observatoire de Haute-Provence, France, 15–26 July 1996

M.-P. Véron, CNRS – Observatoire de Haute-Provence; P. Crane, ESO

The 5th ESO/OHP Summer School was hosted again at the Observatoire de Haute-Provence from 15–26 July. The school which has so far only been offered bi-annually, selects 18 of Europe's most promising young doctoral students in astronomy. Courses of lectures, observations and analysis form the intellectual menu. These are aimed at the

Figure 1: As in past years, the official group photo is taken during the break in the talk by Ray Wilson. The organisers are still trying to explain this occurrence. From left to right in the first row: Ray Wilson, M.-P. Véron, K. Eriksson, V. D'Odorico. Second Row: A. Fishburn, W. Gacquer, O. Barziv, N. Christlieb, D. Russeil, G. Dudziak, H. Gleisner, E. Pompei, C. Laffont, and C. Moutou. Third row: P. Crane, T. Stanke, A. Mathieu, M. Dennefeld, R. Voors, P. Royer, J.M. Perrin, J. Fynbo, S. Darbon, P. Goudfrooij, L. Kaper, B. Geiger, H. Schmidt. Missing: Torsten Böhm.

Figure 2: Torsten Böhm explains the vagaries of data reduction systems (or is it French keyboards?) to Norbert Christlieb, Céline Laffont, and Pierre Royer

process of extracting astrophysically digestible results from photons harvested at the telescopes.

The OHP observatory is exceptionally well equipped to provide the ingredients of success for the school. The three main telescopes which are reserved for the students have state-of-the-art instruments and detectors. The site is well placed to provide a proper mix of clear skies and other facilities (proper nourishment, other sustenance, access to recreation, etc.). It is perhaps the other options which provide the ambience which insures that the various items on the menu form a coherent whole and inspire the students, their tutors, and all around to pursue the tasks at hand with vigour and enthusiasm.

The basic ingredients for the school were unchanged from previous years. Students are formed (not divided) into groups of three, and each group is assisted by a tutor. The tutors helped the students prepare observing programmes for both imaging and spectroscopy. The telescopes and instruments were prepared carefully according to the requirements of the programmes, and the observations were performed, data were obtained and analysed.

The tutors this year were: Torsten Böhm, Paul Goudfrooij, and Lex Kaper from ESO; Denis Gillet, Sergio Ilovaisky, both of whom have participated in previous years, Jean-Marie Perrin and Stephan Darbon from OHP. There is no doubt that the success of the school is very much a result of their efforts. Indeed, this has been confirmed to us by the students themselves.

T. Böhm led C. Laffont, N. Christlieb and P. Royer in a study of Herbig Ae/Be stars. With the AURELIE spectrometer, they monitored such a star to look for spectral line variability of "active" lines which are a good indicator for the presence of a magnetically structured stellar atmosphere. At the 1.2-m telescope, they observed a young open cluster in several colours in order to classify the stars in the HR diagram.

D. Gillet led J. Fynbo, C. Moutou and E. Pompei in a study of the β Cephei star BW Vul in an attempt to distinguish between Stark broadening introduced by the passage of the compression wave and shock emission during the line-doubling phase. They used the AURELIE spectrometer to measure variations in the Hβ line. Their imaging project was to see if the small migrating bump reported in the light curve of XX Cygni is real or an artifact.

The group (O. Barziv, W. Gacquer and T. Stanke) led by P. Goudfrooij observed some S0 galaxies in imagery to study their (B–I) colour gradients and in spectroscopy, at the 1.93-m telescope with CARELEC, to measure metallicity gradients, using the M_{g2} index.

S. Ilovaisky led V. d'Odorico, G. Dudziak and H. Gleisner in a search for an optical counterpart for ROSAT X-ray sources. They used the 1.2-m telescope to obtain multi-colour images of the X-ray fields, in order to select possible optical candidates. Using CARELEC, they then obtained low-dispersion spectra of the candidates. The spectra were searched for peculiar spectral features which would identify the optical counterpart of the X-ray source.

Under the guidance of L. Kaper, A. Mathieu, H. Schmidt and R. Voors tried to find out by imaging the field at Hα with a narrow-band filter if the high-mass binary Cygnus X1 is a run-away system with an associated bow shock. At the 1.93-m telescope they have mapped a strong nebular emission line as a function of the distance from the blue variable star P Cygni.

J.-M. Perrin and S. Darbon led K. Eriksson, B. Geiger and D. Russeil in a search for extended red emission (ERE) fluorescence in the compact H II region Sh 61. Initially, interference filter images were obtained at the 1.2-m telescope in order to find the possible location of the ERE. Subsequently, low-dispersion spectra of these regions were taken with CARELEC.

The other major ingredient in the school was a series of invited lectures on topics related to observations, instrumentation, detectors, and other closely associated topics. Ray Wilson gave a stimulating lecture on the design criteria of modern telescopes and the progress that has been made in the last few years. Guy Monnet gave a comprehensive overview of instrument designs and the regions of parameter space that they fill. Michel Dennefeld described optical detectors and emphasised the physical processes and limitations of CCDs. Poul-Eric Nissen presented an overview of high-resolution spectroscopy in which he described design criteria for an echelle spectrograph, and showed some results that can be obtained. Jean-Paul Sivan's lecture was aimed at low-resolution spectroscopy and its applications to the determination of density, temperature and abundances in various types of emission-line nebulae, to rotation curves of galaxies or to the measurements of quasar redshifts. Hermann-Josef Röser talked about imaging and photometry. His comprehensive lecture reviewed and consolidated a large number of topics partially covered by other lectures, and went on to show some real results. Richard Hook gave an overview of how computers are used in astronomy for data analysis and of some of the major software efforts in astronomy. He also described some techniques for resolution enhancement. Finally, but actually initially (although not planned that way) Michel Mayor described his own work done on site at OHP in which he discovered the first extra-solar planet around a normal star.

Of course, there were some sweet parts to the school. A Sunday excursion to the gorges du Verdon provided an opportunity to view some of the surrounding country side. This included a short stop in Moustier Sainte-Marie, a small village nestled in the side of a mountain and famous for its pottery. The trip continued on with a nice picnic at the Lac de Sainte-Croix. After the picnic, a large number of people rented paddle boats or canoes to go into the Gorges. The highlight of this was an unplanned and only marginally accidental swimming event which occurred when one group capsized in their canoe.

All schools of this sort must end, and this one did too! On the final day, each group of students presented a summary of their results. Although the analysis techniques had for the most part just been learned, all groups presented interesting and in some cases potentially publishable results. This is no small achievement considering that most people were entirely new to the scientific subject, the observing process, and the data analysis.

Although this school has not yet achieved the reputation of some other schools in France, the organisers thought that each student would nevertheless appreciate the “Cordon Lavande” they received and which certifies their achievements.

ANNOUNCEMENTS

ESO Director General Reappointed

Following an Extraordinary Council Meeting on 13 September 1996, to consider the Contract of the Director General, the ESO Council extended the current mandate of Professor Riccardo Giacconi as Director General to 31 December 1999.

Professor Giacconi became Director General of ESO on 1 January 1993, after a 12-year term as Director of the Space Telescope Science Institute in Baltimore. While a Professor at Harvard University, he directed the Einstein X-ray Observatory. His early career achievements include the discovery of X-ray stars and the development of the first all-sky X-ray satellite observatory Uhuru.

PERSONNEL MOVEMENTS

(15 July – 30 September 1996)

International Staff

ARRIVALS

EUROPE

CUBY, Jean-Gabriel (F), Infrared Instrumentation Specialist
STEINER, Katjuscha (D), Administrative Clerk Personnel
KARBAN, Robert (A), Software Support Engineer
PIEPER, Holger (D), Short-term Student

CHILE

PANTIN, Eric (F), Fellow
BYSTRÖM, Rune (S), Associate SEST

DEPARTURE

EUROPE

HINTERSCHUSTER, Renate (D), Draughtswoman
CLEMENTS, David (GB), Fellow

Local Staff Chile

ARRIVALS

RIVERA, Andres (RCH), Optical Detector Engineer

New ESO Scientific Preprints

(July–August 1996)

1158. D. Minniti et al.: High Dispersion Spectroscopy of Giants in Metal-Poor Globular Clusters. II. Oxygen and Sodium Abundances. *ApJ.*
1159. G.A. Wade et al.: An Analysis of the Ap Spectroscopic Binary HD 59435. *AA.*
1160. N.S. van der Bliek, J. Manfroid and P. Bouchet: Infrared Aperture Photometry at ESO (1983–1994) and Its Future Use. *AA.*
1161. S. Hubrig and G. Mathys: The λ 3984 Feature in Late-B Spectroscopic Binaries. *AA.*
1162. P.A. Mazzali et al.: Properties of the Be Stars in the Field of the SMC Cluster NGC 330. *AA.*
1163. D. Minniti et al.: Background Giants in the Field of the Globular Cluster M22: Kinematics of the Galactic Bulge. *A.J.*
1164. S. Heathcote et al.: Hubble Space Telescope Observations of the HH47 Jet: Narrow Band Images.
1165. M.-H. Ulrich: The Narrow Variable Components of C IV in NGC 4151 from 1981 to 1987. *M.N.R.A.S.*
1166. D.L. Clements and W.J. Couch: Candidate Primeval Galaxies in the Hubble Deep Field. *M.N.R.A.S.*
1167. R.A. Méndez and W.F. van Altena: Galactic Structure Towards the Open Clusters NGC 188 and NGC 3680. *A.J.*
1168. S. Savaglio et al.: The Shape of the Ionising UV Background at $z\sim 3.7$ from the Metal Absorption Systems of Q0000–2619. *AA.*
1169. F. Courbin et al.: Sub-Arcsecond Imaging and Spectroscopy of the Radio-Loud Highly Polarized Quasar PKS 1610–771. *AA.*
1170. A.F.M. Moorwood: Starburst Galaxies. *Space Science Reviews.*
1171. A.A. Zijlstra and J.R. Walsh: Two Planetary Nebulae in the Sagittarius Dwarf Galaxy. *AA.*
1172. I.N. Reid et al.: Starcounts Redivivus II: Deep Starcounts with Keck and HST and the Luminosity Function of the Galactic Halo. *A.J.*
1173. M.-H. Ulrich and K. Horne: A Month in the Life of NGC 4151: Velocity-Delay Maps of the Broad-Line Region. *M.N.R.A.S.*
1174. G. De Marchi et al.: The Density Profile of 47 Tucanae. *ApJ* Letters.
1175. F. Comerón, G.H. Rieke and M.J. Rieke: Properties of Low Mass Objects in NGC 2024. *ApJ.*
1176. I. Rüedi et al.: Magnetic Field Measurements on Moderately Active Cool Dwarfs. *AA.*
1177. Lin Yan and J.G. Cohen: A Spectroscopic Survey for Binary Stars in the Globular Cluster NGC 5053. *AJ.*
1178. L.N. da Costa et al.: The Mass Distribution in the Nearby Universe. *ApJ* Letters.
1179. R.A. Méndez et al.: Starcounts in the Hubble Deep Field: Constraining Galactic Structure Models. *M.N.R.A.S.*
1180: D.L. Clements and A.C. Baker: Misclassified Merging Ultraluminous Infrared Galaxies. *AA.*
1181. H. Boehnhardt, J. Babion and R.M. West: An Optimized Detection Technique for Faint Moving Objects on a Star-Rich Background. A Search for the Nucleus of Comet 46P/Wirtanen. *AA.*
1182. R. Ottmann, T.A. Fleming, L. Pasquini: ROSAT All-Sky Survey Observations of Pop II Field Binaries: X-Ray Activity of Old, Metal-Poor Stellar Coronae. *AA.*
1183. S. Moehler, U. Heber, G. Rupprecht: Hot HB Stars in Globular Clusters – Physical Parameters and Consequences for Theory. III. NGC 6752 and Its Long Blue Vertical Branch. *AA.*
1184. P. Molaro, P. Bonifacio, F. Castelli, L. Pasquini: New Beryllium Observations in Low-Metallicity Stars. *AA.*