ing and constructing these instruments.

I have no illusion that we will not have problems. We will run into technical, financial or schedule problems, we might even run into some contractual problems, but that is not a serious worry. There is enough talent and enough good will on both sides to solve the problems as they arise. At the end of this phase of design and construction, there is the commissioning of the instruments when both your teams will be rewarded, not only with doing the challenging work, but also with the opportunity to carry out very major science programmes. With your instruments on 8-m telescopes on Cerro Paranal, you will enter wholly new domains of parameter space which will no doubt lead to spectacular results and interesting discoveries.

I close by reiterating the satisfaction in our organization of having attained these contracts, of expressing our confidence in the talents and abilities of the teams and of anticipating with pleasure our collaboration in the many years to come until we meet on Cerro Paranal to commission these beautiful devices to explore the southern sky.

Coudé Near Infrared Camera Instrument Contract Signed

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The Coudé Near-Infrared Camera (CONICA) will be one of the first instruments to be constructed outside ESO for the Very Large Telescope (see the review article on VLT instruments in *The Messenger*, **65**, pp. 10–13). A contract for the construction of CONICA has been signed by ESO and a Consortium headed by the Max-Planck-Institut für Astronomie (MPIA, Heidelberg), with the Max-Planck-Institut für Extraterrestrische Physik (MPIE, Garching) and the Osservatorio Astronomico di Torino (OATo, Turin) as partners. The signature of this contract is the first step implementing a policy of active ESO community participation in instrument development. Equipping four large telescopes with four foci each is clearly beyond the capability of ESO, and the success of the VLT will depend significantly on the ability of the astronomy community in Europe to build state-of-the-art instrumentation.

CONICA is the instrument which is labelled High-Resolution Near-Infrared Camera in the VLT Instrumentation Plan. It will be located at the coudé focus of the first unit telescope, where it will provide diffraction-limited images, and do polarimetry and low resolution spectroscopy. The instrument will cover the 1 μm to 5 μm wavelength region. Where possible, it will use directly the diffraction-limited images provided by the VLT adaptive optics system. Speckle imaging methods, image selection, and methods combining partial adaptive optics or rapid guiding with image selection and interferometric imaging can be used when the adaptive optics system does not produce a diffraction-limited focus. Spectral resolution will be achieved with about 40 broad-band and narrow-band filters, as well as with a selection of grisms which provide a spectral resolution between 500 and 1000 throughout the wavelength range. Polarimetry can be done using a set of wiregrid analysers and two Wollaston prisms. Scientific programmes which will be pursued with CONICA include studies of outflows and disks of young stellar objects, search for low mass companions of nearby stars, imaging of envelopes around red giants, studies of the galactic centre, the energetics of Seyfert galaxies and quasars, and highly resolved images of radio jets and hot spots.

Figure 1 shows the optical concept of CONICA. The telescope light beam passes a tunable atmospheric dispersion compensator (TADC) before entering the camera proper. The TADC is removable, and is needed only for broad-band imaging at shorter wavelengths. The entrance window (EW) seals the cyrostat, which maintains the cold optics at a temperature of about 70°K, and accepts a field with 90 mm (45 arcsec) in diameter. Cooling of the cryostat is provided by a closed-cycle cooler. The focal plane assembly (FPA), located at the coudé focus, consists of two wheels that carry sets of field-of-view masks, slits, coronagraphic stops, mirrors, and test targets. The light which is reflected from the telescope-oriented faces of the various focal plane stops is used to feed a visible field-viewing camera which guarantees proper pointing of the instrument.

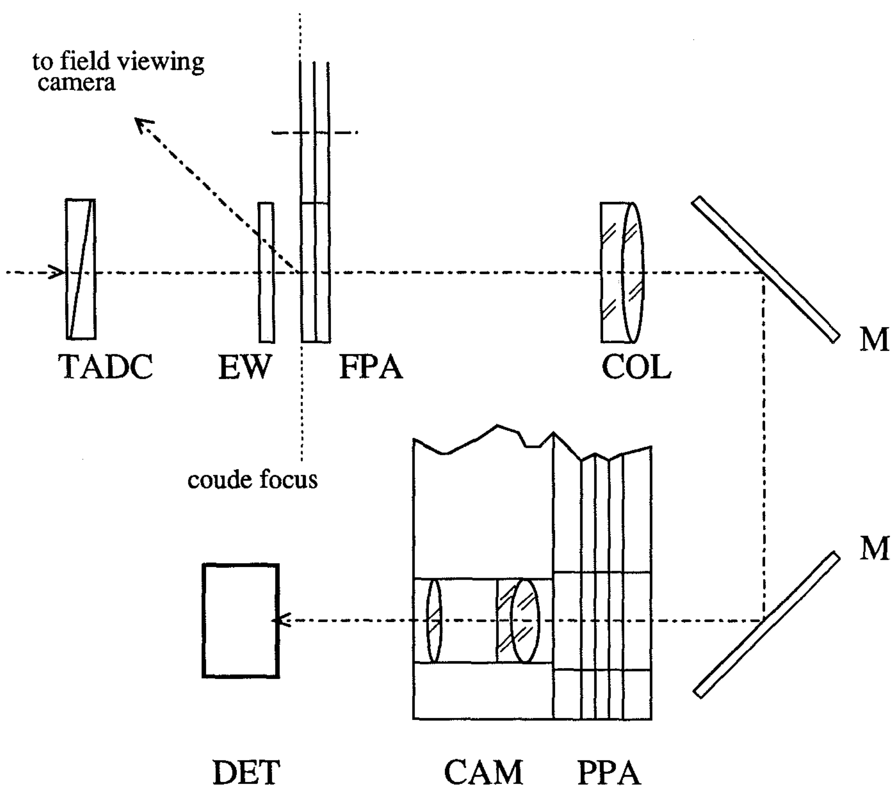

Figure 1: *A schematic of the CONICA optical layout.*

A collimator (COL) lens generates a parallel beam and produces a pupil image near the pupil plane assembly (PPA). The collimator will be used for the entire wavelength range covered by CONICA. Two mirrors fold the light path, which result in a compact cryostat. The pupil plane assembly consists of five wheels carrying a selection of Lyót stops, filters, grisms, and polarization analysers. An additional wheel carries camera lenses (CAM) which provide a selection of five magnifications in order to use efficiently the accepted field of view and the angular resolution throughout the 1 μm . . . 5 μm range. There will be two sets of camera lenses, optimized in optical performance and throughput for the 1 μm . . . 2 μm and the 2 μm . . . 5 μm spectral ranges.

Two 256×256 pixel detectors (DET), cooled to their optimum operation temperature between 20°K and 70°K, will be included in the camera in order to cover the wavelength range efficiently. A SBRC InSb detector is foreseen to be used mainly for the long wavelength region, a Rockwell NICMOS 3 HgCdTe detector is baselined for direct imaging and speckle applications at short wavelengths. Detectors are selected by rotating the folding mirror assembly; it will not be possible to observe with both detectors simultaneously. The field subtended by a detector will range from 3 arcsec for diffraction-limited resolution at 1 μm to 33 arcsec for full field viewing. The optical design of the camera is such that CONICA can be upgraded with larger (512×512 pixels) detectors as soon as these become available.

The optics, mechanics and cryogenics, as well as the control electronics will be constructed by MPIA, who also host the principal investigator of the project. The detector electronics will be built jointly by MPIE and OATo. MPIE will also supply the data analysis software and a cold fast shutter unit. CONICA is scheduled for commissioning at the VLT in December 1997.

FORS – The Focal Reducer for the VLT

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Introduction

On February 6, 1992 at the ESO Headquarters in Garching the FORS instrument project for the ESO Very Large Telescope was publicly started with a kickoff meeting. FORS, the FOcal Reducer/low dispersion Spectrograph, will be the first instrument built outside ESO to be installed at the VLT observatory.

The idea for a set of general-purpose focal reducers for the VLT can be traced back to the recommendations of the ESO Working Group on Imaging and Low-Resolution Spectroscopy, published in VLT Report No. 52 (1986).

The experience gained with EFOSC-type instruments at the 3.6-m telescope and at the NTT then led ESO to propose in the VLT Instrumentation Plan of June 1989 the construction of two dioptric focal reducer/low dispersion spectrographs for deep-imaging, low-resolution and multi-object spectroscopy. The Cassegrain foci were chosen for the instruments because of their high throughput, to minimize the amount of scattered light and to make them suitable for polarimetric observations.

Following a Call for Proposals issued in 1990 a consortium composed of three German astronomical institutes (the Landessternwarte in Heidelberg and the University Observatories of Göttingen and München) was chosen in 1991 for the realization of the project.

The Plan

It is expected that the demand for observing time with a focal reducer at the VLT will be comparable to or larger than on the existing large ESO telescopes. FORS I and II will therefore be something like the workhorses of the VLT, and their duplication will save construction costs and later simplify operation and maintenance. The two identical instruments will be installed on Unit Telescopes 1 and 3 in 1996 and 1998, respectively.

Their basic observing modes will be

(1) direct imaging,

(2) low-dispersion grism spectroscopy,

(3) multi-object spectroscopy,

(4) polarimetry.

These modes can be combined e.g. to allow imaging polarimetry or spectropolarimetry.

The instruments are specified to work over the wide wavelength range 330 to 1100 nm. Their efficiency (excluding the detector) should be better than 50% at wavelengths greater than 350 nm and peak near 450 nm with approximately 78%. The detector will probably be a large CCD with 2048 × 2048 pixels and a 24 μm pixel size.

The Implementation

The fundamental parameters of the optical design are the image scale at the VLT Cassegrain focus, which is 528 μm/arcsec, and the intended final image on the detector. Combining the expected image quality of the VLT telescopes with the pixel size of available large CCDs, a scale of 0.2″/pixel was specified for the standard observing mode.

In order to obtain a large field of view and to allow accurate polarimetry, an all-dioptric design was chosen. Its principal layout was derived by ESO optician B. Delabre on the basis of the experience gained with EFOSC.

Figure 1 gives the optical paths of the light passing from three different positions in the focal plane of the telescope (situated to the left of Figure 1) to CCD detector (on the right). The first group of lenses (the collimator) produces a parallel beam and also forms an image of the telescope's entrance pupil (i.e. of the main mirror). The second group of lenses (the camera) then focuses the parallel beam onto the CCD detector, thus re-imaging the large image in the telescope focal plane on a smaller scale in the detector plane. The standard "wide-angle" collimator will have a focal length f of 1230 mm and a collimated beam diameter of 90 mm. During periods of excellent seeing it will be possible to double the image scale by exchanging the standard collimator by a second, high-resolution collimator (f = 615 mm, collimated beam diameter 45 mm) using a remotely controlled internal exchange mechanism.

The parallel beam section is tightly filled with various optical components. There are rotatable phase retarder plates and a Wollaston prism for polarimetric observations, grism, and broad-band colour filters. All these components can be moved in and out of the beam by means of rotating wheels or a swing arm. The grism presently