ESO and AMOS Signed Contract for the VLTI Auxiliary Telescopes

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The company AMOS (Liège, Belgium) has been awarded, last June, an ESO contract for the delivery of the Auxiliary Telescopes (ATs) of the Very Large Telescope Interferometer (VLTI). Each of these telescopes has a main mirror of 1.8-metre diameter. They move on rail tracks on the top of the Paranal mountain. Together with the main 8.2-m VLT Unit Telescopes (UTs), they will ensure that the VLTI will have unequalled sensitivity and image sharpness that will allow front-line astronomical observations.

This contract was signed for the design, manufacturing and testing in Europe of two ATs and of the full set of on-site equipment for the 30 AT observing stations. An option for a third Auxiliary Telescope is also part of the contract. The delivery in Europe of the first AT is planned for June 2001 and the first observations with the first two ATs at Paranal are planned for early 2002.

More details can be found at: http://www.eso.org/outreach/press-rel/pr-1998/phot-25-98.html

The photo of a 1/20 scale model built by AMOS in response to the call for tender illustrates the main conceptual features of the VLTI Auxiliary Telescopes. The 1.8-m telescope (with an Alt-Az mount, i.e. exactly like the Unit Telescopes) is shown here in observing conditions. It is rigidly anchored to the ground by means of a special interface. The light is directed via a series of mirrors to the bottom of the telescope from where it is sent on to the underground delay line tunnel. The AT Enclosure consists of segments and is here fully open. During observation, it protects the lower part of the telescope structure from strong winds. The Enclosure is supported by the transporter (the blue square structure) that also houses electronic cabinets and service modules (the grey boxes) for liquid cooling, air conditioning (the red pipes), auxiliary power, compressed air, etc., making the telescope fully autonomous. When the telescope needs to be relocated on another observing station, the transporter performs all the necessary actions such as lifting the telescope, closing the station lid (the white octagon), translating the telescope along the rails, etc. The complete relocation process will take less than 3 hours and shall not require re-alignment other than those performed remotely from the control room at the beginning of the next observation.

UT1 Passes "With Honour" the First Severe Stability Tests for VLTI

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1. Introduction

Over the past years, a significant effort has been put in verifying and improving the capability of the VLT Unit Telescope (UT) to reach the very demanding Optical Path Length (OPL) stability at the nanometer level, as required by the VLT Interferometer (VLTI). Up to now, this has been done primarily by analysis using detailed Finite Element Models with inputs from dedicated measurement campaigns such as the characterisation of micro-seismic activity at Paranal [1], [2], vibration tests on IR instruments closed-cycle coolers and pumps [3], as well as tests at subsystem level on the M2 unit, on the enclosure, on the telescope structure equipped with dummy mirrors, etc. [4].

With the commissioning of the first VLT telescope at Paranal, time has come to directly measure the dynamic stability of the 8-m telescopes in real operational conditions.

A dedicated commissioning task was undertaken on July 23–30 to monitor the mirror vibrations with highly sensitive accelerometers. A brief summary of the results is presented here.

2. Measurement Set-up

The measurement equipment consisted of eight high-sensitivity accelerometers (Wilcoxon 731A) connected to two digital acquisition units (DSPT SigLab 20-42) controlled from a PC running Matlab.

The accelerometers were placed as follows:

4 accelerometers attached at the outer edge of the primary mirror M1 sensing motion along the optical axis. The signals are averaged to obtain an estimate of the M1 axial displacement (piston).

1 accelerometer inside the M2 unit monitoring the motion of the mirror along the optical axis.

1 accelerometer on the M4 arm of the Nasmyth Adapter–Rotator sensing the motion along the normal of the future M4 mirror.

1 accelerometer on the M5 unit attachment flange sensing the motion along the normal of the future M5 mirror.

1 accelerometer on the M6 unit attachment flange sensing the motion along the normal of the future M6 mirror.

Post-processing was done using dedicated routines written in Matlab.

3. Main Results

Figure 1 shows the fringe visibility loss resulting from the mirror vibrations in various operational conditions and for three different observing wavelengths: visible (0.6 μm), near infrared (2.2 μm) and thermal infrared (10 μm). The VLTI error budgets call for a 1% visibility loss due to vibrations inside the telescope for any of these observing wavelengths. This corresponds respectively to an OPL variation of 14, 50 and 215 nanometers r.m.s.