The 3.6-m telescope is now well prepared for the arrival of TIMMI2, the successor of TIMMI, under construction at the Sternwarte Jena, to be installed end of 1998 (see [5] or http://www.eso.org/observing/vlt/instruments/visir/timmi2/index.html). Slight improvements (removal of the remaining astigmatism of M2, alignment of the mechanical and optical axis of M2 . . .) are still to be done and make sense for observations at shorter wavelengths.

Our thanks go to the mechanic support team who largely contributed to these improvements.

References

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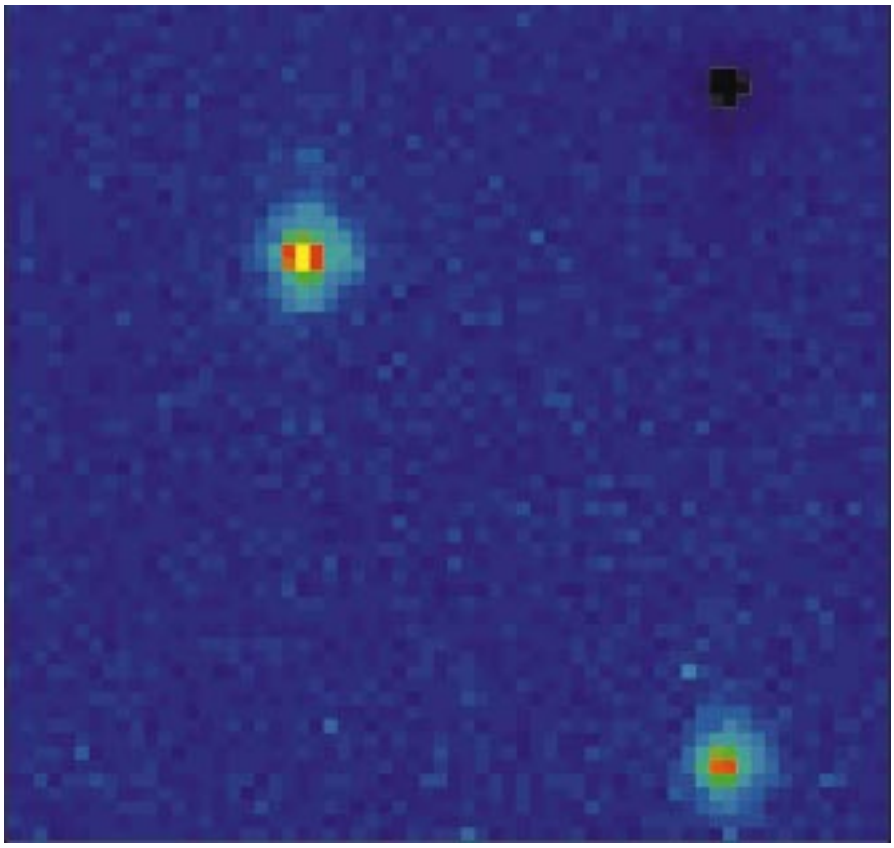

Figure 4: Colour plot of the image of α Centaurus. For more details, see text.

Image Quality of the 3.6-m Telescope (Part VII) Installation of a Spring System in the 3.6-m M1 Mirror Cell

R. GREDEL, S. GUISARD, G. IHLE

The installation of load cells in the 3.6-m M1 mirror cell in April 1997 (see June issue of *The Messenger*) allowed us for the first time in the history of the 3.6-m telescope to measure the forces exerted by the astatic levers on the main mirror. These measurements were required to optimise the force distribution among the three support rings, and to determine the characteristics of a spring system to correct for the aberrations of M1.

For the three axial support rings A, B, and C, the levers support 4385.0 kg, 4467.6 kg, and 2096.4 kg, respectively. These are fractions of 0.4005, 0.4080, and 0.1915, of the total weight of M1. The errors in the measurements are less than 0.05%. The force distribution is close to optimal fractions of 0.4080, 0.4024, and 0.1896, for rings A, B, and C, respectively, as calculated by Lothar Noethe and Franz Koch. The present load distribution results in wavefront aberrations of 9.7 nm RMS. This is significantly smaller than the errors introduced by the polishing errors of M1. Thus, it was decided not to modify the load distribution among the three rings.

The load distribution among the astatic levers in the outer ring follows a sinusoidal pattern. This is required to correct for the polishing errors of M1. As explained in detail in previous articles in *The Messenger* by Stephane Guisard, a degradation of the image quality occurs away from Zenith. This is mainly caused by the re-appearance of the intrinsic aberrations of M1, because the force exerted by the astatic levers are diminished by a factor which is proportional to cos(ZD), where ZD is the zenithal distance of the telescope. The corrective forces superimposed to the astatic support of M1 are thus not constant. In order to have a constant correction independent of ZD, it was decided to install a spring system in the M1 mirror cell. This idea was originally suggested by Rudolph le Poole, who spent two months on La Silla as an external consultant to the 3.6-m team. The springs exert a force on M1 which is independent of ZD.

The compensating force required by the springs was calculated for each lever in all three rings. It is up to 90 kg, positive for some, negative for others. With the addition of the springs, the weight of the astatic levers had to be adjusted. For most of the levers, this was achieved by moving the lever arm horizontally. For a few levers, weights up to 15 kg had to be added. The springs were installed during 10 nights of technical time in September.

Final image quality checks were performed with CCD #32 right after the spring installation. Unfortunately, the weather was very bad. Like many other observers who come to La Silla these days, we are not exempt of the effects of this year's very strong El Niño. The few measurements we have suggest that the optical quality of the 3.6-m away from Zenith has improved. The triangular term Z10 is now independent of ZD and near 0, except for one position at ZD = 60 degrees to the south, where it is 0.35 arcsec. This is most probably caused by the lateral support of the M1. Other aberrations such as astigmatism have not improved. They are believed to arise from a non-adequate lateral support as well. Because of these problems, it is planned to replace the analogue pressure regulator for the lateral support. In the coming months, we wish to install a servo control of the pneumatic pads with loop closure over the lateral load cell readings.