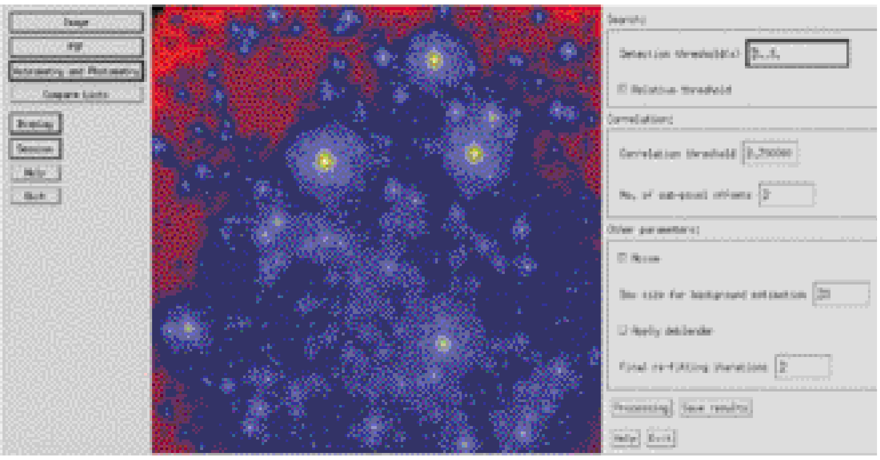

Figure 11: Widget based GUI interface.

image processing, in order to allow the user to analyse a stellar field, produce an output list of objects and compare different lists, e.g. referred to different observations of the same target. The input image is supposed to be just calibrated. The code is entirely written in the IDL language and has been tested on Windows and Unix platforms supporting IDL v. 5.0 or later. A widget-based graphical user interface has been created (Fig. 11). The main widget appearing on the computer screen is an interface to call secondary widget-based applications, in order to perform various operations on the image. The basic documentation about the code can be found in the on-line help pages and in the attached manual. IDL users might wish to run interactively the StarFinder routines, without the widget facilities: complete documentation on each module is available for this purpose. A copy of StarFinder can be obtained in the Web page of the Bologna Observatory (www.bo.astro.it) or by contacting the writer and maintainer of the code (E.D.) at the e-mail address diolaiti@bo.astro.it

5. Conclusions

The elaboration of real and simulated data seems to prove the effectiveness of StarFinder in analysing crowded stellar fields characterised by high Strehl ratio PSFs and correct sampling, reaching in this case the full utilisation of the data information content. The code can be applied also to low Strehl or under-sampled data with results comparable to those attainable by other methods. StarFinder is also reasonably fast: the analysis of a field comparable to the Galactic centre image requires between 5 and 10 minutes on a normal PC (Pentium Pro-64 Mb-350 MHz).

The first improvement of StarFinder, available in a near future, will allow to analyse star fields with space variant PSF.

Acknowledgements

François Rigaut is acknowledged for kindly providing the PUEO image of the Galactic centre and for supporting the initial development of this method.

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VLT Laser Guide Star Facility: First Successful Test of the Baseline Laser Scheme

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The planned baseline laser for the VLT Laser Guide Star Facility (LGSF) consists of dye laser modules, capable of producing > 6.5 W CW each (1). Two such modules can fit on a 1.5 × 1.5 m optical table. The laser concept was developed in a preliminary LGSF study phase (2) and is a variation of the ALFA laser (3) used in Calar Alto (Spain). It uses two Coherent Inc. all-solid state Compass Verdi 10 W lasers at 532 nm, to pump a modified Coherent model 899-21, continuous-wave (cw) ring-dye laser. The dye is Rhodamine 6G (Rh6G).

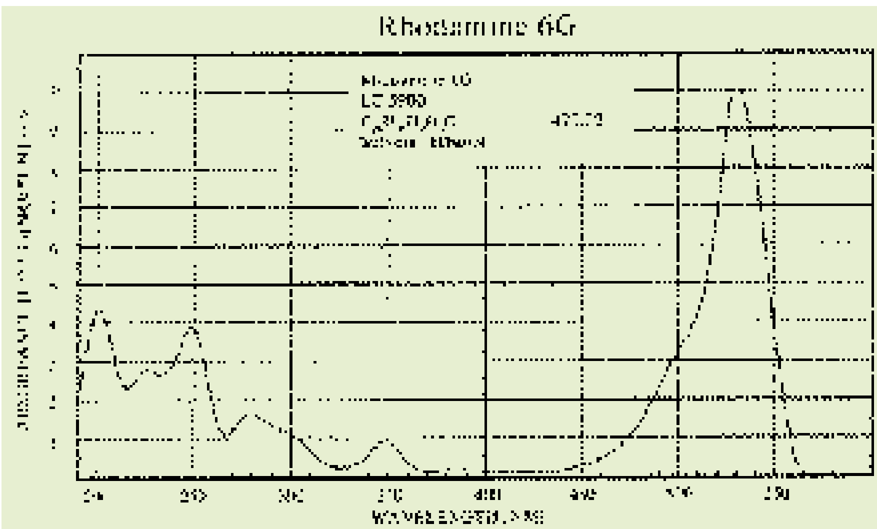

Figure 1: Absorption profile of the laser dye, Rhodamine 6G.

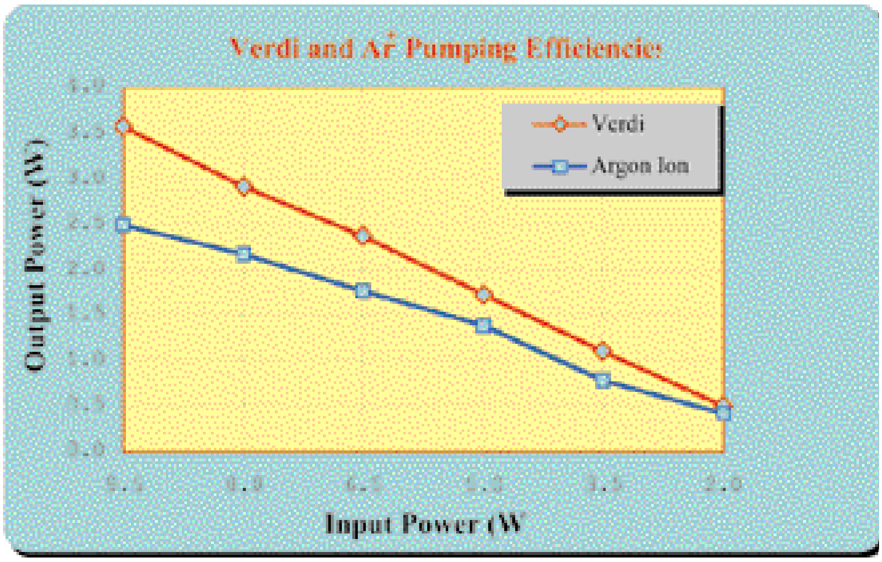

Figure 2: Output powers at 589 nm from the 899-21 ring-dye laser, for different laser-pump powers. The Verdi laser (532 nm) and the Innova Ar^+ lasers from Coherent Inc. were used. The Verdi pumping gives up to 44% more output, at equivalent pumping powers. The base - line laser module proposed for LGSF will have 20 W pump input power.

We report here the results of testing the LGSF baseline configuration with one 10 W Verdi pump. For this test we pumped the 899-21 ring-dye laser, using alternatively the ALFA Argon-ion pump, or one 10 W CW Verdi. We have used both relatively aged as well as fresh dye solutions. This test is one of a series that has been carried out during the period 13–17 May 2000 in the ALFA laser laboratory at Calar Alto by ESO in collaboration with the team at the Max-Planck-Institut für Extraterrestrische Physik, that is responsible for the ALFA laser system.

Several advantages are obtained with the solid state Verdi as pump laser:

• The pump laser electrical power consumption (for example an equivalent output power of 4.5 W CW) is reduced by a factor ~ 37 from 46 kW to 1.25 kW, allowing the laser system to be installed in the VLT telescope area.

• The Verdi pump wavelength of 532 nm is perfectly matched to the absorption peak of Rh6G, as opposed to the main Ar^+ wavelength at 514 nm (Fig. 1). The dye-laser output power should, therefore, increase by > 40%.

• The size of the pump laser is reduced by a factor ~ 5, allowing a smaller optical bench to be used.

The Experiment

We have modified the ALFA laser-bench set-up to accommodate flipping between pump lasers. We have limited the experiment to the use of a single Verdi laser, with 9.5 W maximum pump power into the 899-21 dye laser. We varied the pump powers of the Ar^+ and Verdi lasers, from 2 to 9.5 W, measuring the dye-laser output power and beam quality at 589 nm. At each iteration, we have optimised the 589 nm output power adjusting the condensing optics focus on the dye jet, and the alignment of the ring resonator laser. This was necessary because of the varying thermal load on the resonator optics. The dye-solution circulation pump was set to a pressure of 11 bar.

Using the Verdi laser as pump we observed the following:

• less critical alignment tolerances in the ring-dye laser, compared to the Ar^+

• lower output power sensitivity to dye aging.

• higher output power, up to 3.6 W CW for 9.5 W pump, with a 44% increase over the Ar^+ pump efficiency.

Optimisation of the nozzle and an increase of the dye-circulation pump pressure are expected to give a further improvement in output power.

In Figure 2, the single-mode dye-laser output power as a function of the pump power at the 899-21 dye-laser input is shown. The output power reveals a linear dependence on the pump power up to the maximum available input power of 9.5 W. At this pump power, the single-mode output power was measured to be 3.6 W with an extremely good beam quality ($M^2 = 1.13$). The optical conversion efficiency of 38%, together with the high beam quality, are excellent results for a high-power CW dye-laser system. The free-flowing dye-jet stream was not fully optimised for the 532 nm wavelength. We expect to see further improvements in the conversion efficiency when this is optimised.

Conclusions

We now have experimental evidence that the baseline LGSF laser will meet

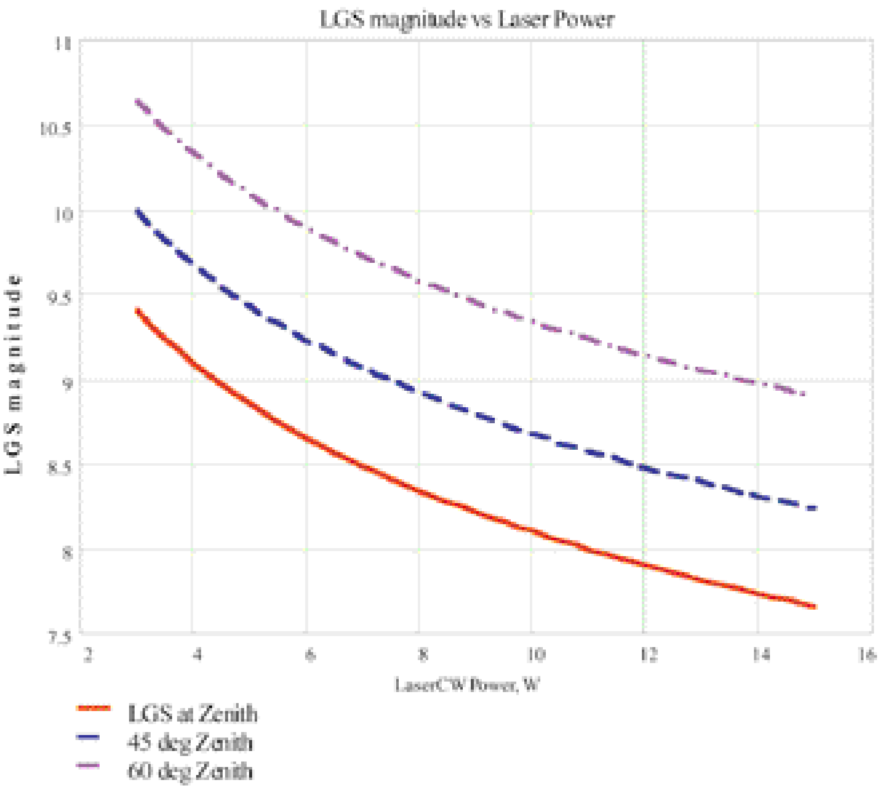

Figure 3: Equivalent V-band magnitude of the LGS, versus sodium laser output power. The one-way transmission assumed for the atmosphere is 0.8 and for the launch optics 0.75, with a sodium column density of 5×10^{13} m^{-2}. These are typical average conditions. The three curves represent different LGS zenithal distances.

the optical power requirement, which is to have 589 nm laser modules producing each ≥ 6.5 W CW of narrow-band (10 MHz) laser output power at the sodium D_2 line.

Even without counting potential improvements arising from the dye-nozzle optimisation, we can expect each module to deliver 7.6 W CW at 589 nm, using the 2 × 10 W Verdi pumps. Two complete dye-laser modules will then produce ≥ 13 W CW at 589 nm.

This experiment, together with the former experimental results of the single-mode fibre laser relay[4], completes the feasibility tests for the innovative concepts of the baseline LGSF.

The dye laser tested has proven very stable and reliable. Before freezing the decision on the final laser system for LGSF, we plan to explore further alternatives.

Finally, in Figure 3, we plot the equivalent LGS magnitude in V-band, assuming average sodium column densities, typical atmosphere and launch telescope transmissions for different telescope zenithal distances.

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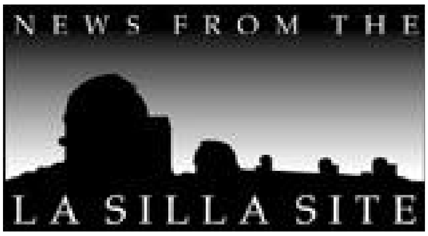
For information on the Compass Verdi V-10 laser, see www.cohr.com



The La Silla News Page

The editors of the La Silla News Page would like to welcome readers of the fifteenth edition of a page devoted to reporting on technical updates and observational achievements at La Silla. We would like this page to inform the astronomical community of changes made to telescopes, instruments, operations, and of instrumental performances that cannot be reported conveniently elsewhere. Contributions and inquiries to this page from the community are most welcome.

2p2 Team News

H. JONES

The 2p2 Team continued towards the implementation at the 2.2-m of the same BOB (Broker for Observation Blocks) observing interface as seen at other ESO telescopes. This requires an interface to be written between the existing BOB software and the non-VLT compatible control software for the Wide-Field Imager (WFI) and 2.2-m. Cristian Urrutia, Tatiana Paz and Eduardo Robledo are heading its development. With this software in place, observers can use the VLT Phase 2 Proposal Preparation System (P2PP) for definition of their exposures, whether they are for Visitor or Service Mode.

In the longer term, there are plans to upgrade the current WFI archiving operations to become identical to those presently on Paranal. Such a system would readily streamline the amount of data handling during archiving. This would be an important step for an instrument such as the WFI, from which we currently see data volumes of around 200 Gb per week, the ingestion of which by the Science Archive in Garching carries large overheads.

In January we bade farewell to Team Leader Thomas Augusteijn who left ESO for the Isaac Newton Group of Telescopes on the island of La Palma in the Canary Islands. Our new leader will be Rene Mendez from CTIO here in Chile, who has interests in Galactic structure and astrometry. We wish him a warm welcome to ESO. Rene will commence work with the team in September. In the meantime, existing team member Patrick François, currently on secondment to ESO from Observatoire de Paris, has taken over Team Leader duties. In February we welcomed Fernando Selman to the team. Fernando is currently undertaking his PhD on massive star-formation regions in the LMC, under the supervision of Jorge Melnick. Around the same time we farewelled long-time Telescope Operator Pablo Prado to the Gemini Project. Our best wishes accompany him.

During the re-aluminisation of 2.2-m M1 in April, Alain Gilliotte and Gerardo Ihle inspected the mirror cell as part of ongoing efforts to find the cause of astigmatism often seen as a result of large zenith travel. With the help of members from the Mechanics Team, they discovered a problem with one of the fixed mirror supports. Correction of this now sees astigmatism reduced to the range 0.07 and 0.15 arcsec up to 60 degree zenith distance. For many applications, the amounts of astigmatism are negligible. Further room for improvement is foreseen by Alain which we hope to accommodate during the coming months. A dedicated *Messenger* article has more details.

At the ESO 1.52-m there have recently been major efforts on several fronts. In the final week of April, the mirror was re-aluminised and a replacement slit-unit installed in the Boller and Chivens spectrograph. This should allow observers greater precision when selecting slit-widths with this instrument. At the same time, the control room of the ESO 1.52-m has been extensively refurbished, giving it the same modern and comfortable working environment of other ESO telescopes.

New (or even old) observers are reminded that information on all of our telescopes and instruments can be found through the team web pages at http://www.ls.eso.org/lasilla/Telescopes/2p2T/ This information is kept up-to-date with all major new developments.