

# **PSL for ISYS follow-up**

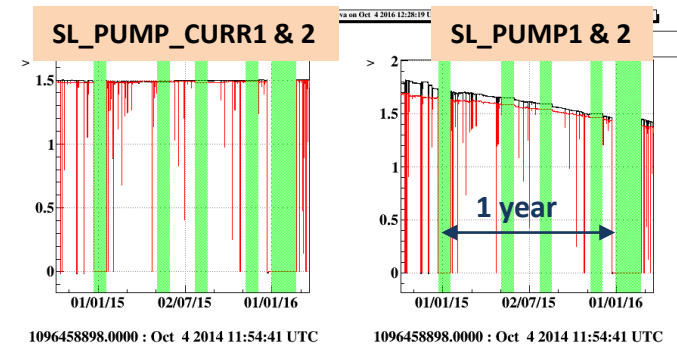
**VIR-0419A-16**

**Main contributors: Cleva, Genin, Pillant, Hreibi, Coulon, Carbognani**

# Laser Bench rejuvenation (optical power) for O2

## □ Slave laser (opt. power)

Up to now the output power and performances are set only by the lifetime of the pumping diodes. The Dilas pump diodes (2014 serie) featured a 15 % power reduction/year



We swap the 2014 diodes with new ones, 40 W nominal optical power serie <sup>(1,2)</sup>

<sup>(1)</sup> was 30 W before, should reduce the ageing

<sup>(2)</sup> only 22 W is required for the slave laser

-> We recover almost the optical power at the first laser launch (2001)

There is still some margin to optimize the optical power <sup>(3)</sup>:

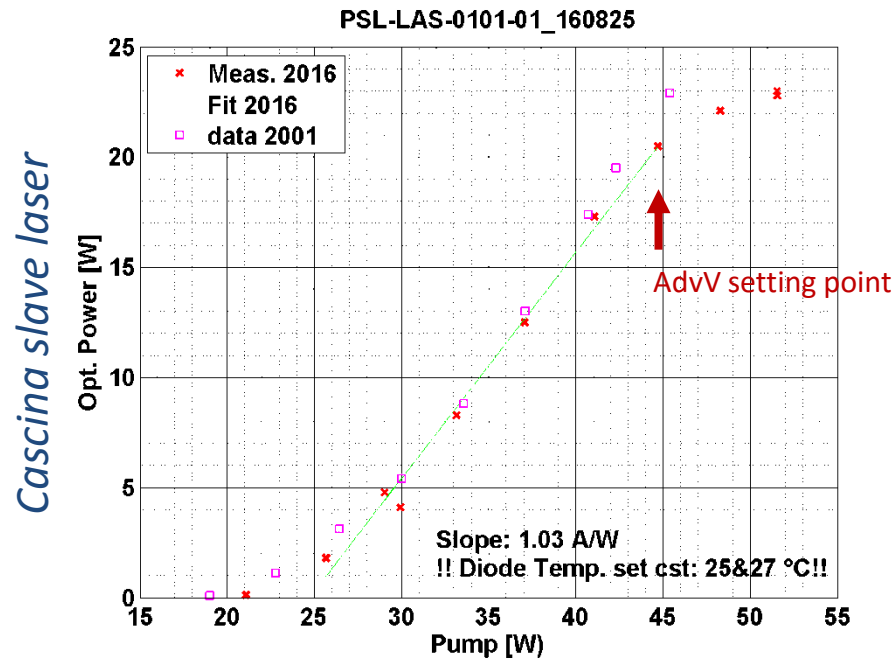
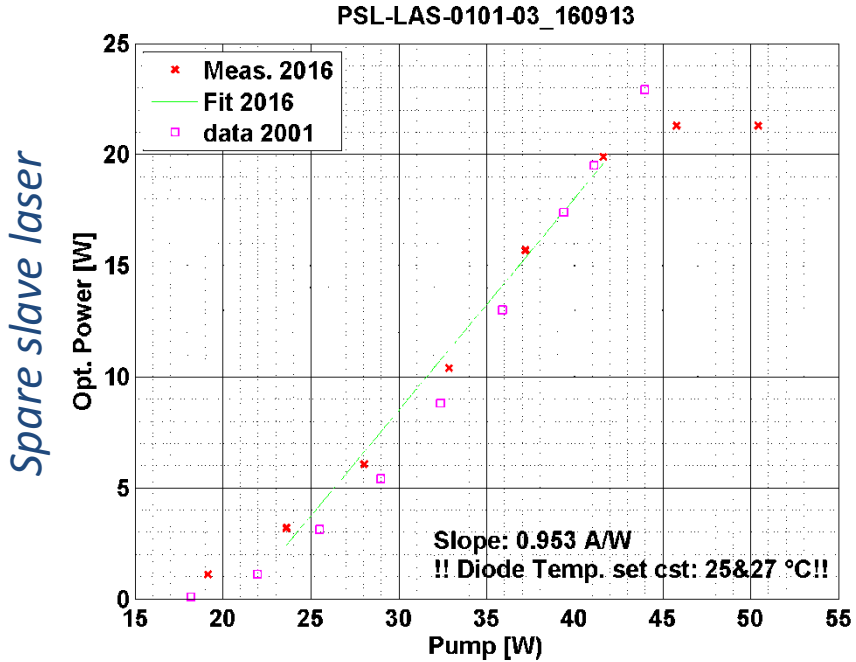
- pump telescope tuning of the slave laser
- diode wavelength centering

but not foreseen so far

<sup>(3)</sup> may have some impact on the beam profile

# Laser Bench rejuvenation (optical power) for O2

## Slave laser (opt. power)



- the spare laser features a saturation above 20 W which could be due to pump misalignment could be checked in Nice
- the on-site laser is set @ 27.9/28.8 A, ie 22 W per pump, ie 20 W output
  - > at least 1 year reserve (assuming 15%/year decrease)
  - > some margin for Pstab fast actuation
  - > nominal power as the seeder of the downstream 60 W amplifier

# Laser Bench rejuvenation (optical power) for O2

- Slave laser (opt. power)

See further references in logentry 34760, 34758, 34756

All the relevant information can found in the PSL dedicated database (see VIR-0386A-16) <sup>(4)</sup>  
*(4) repository path to be set soon*

# Laser Bench rejuvenation (optical power) for O2

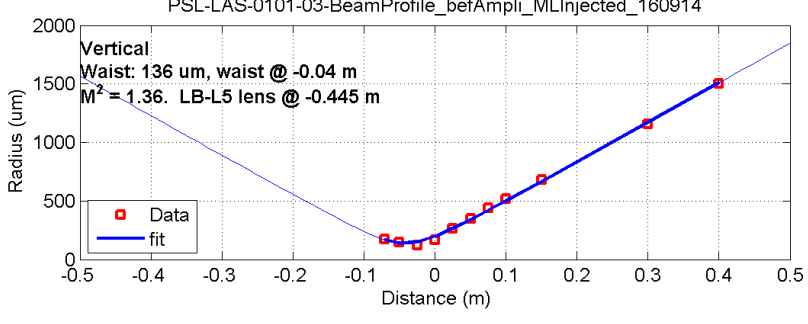
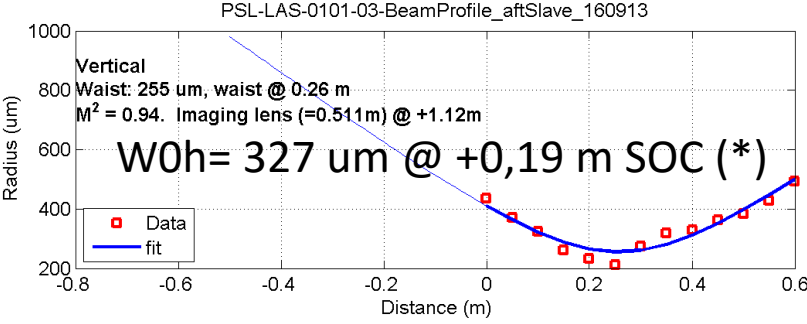
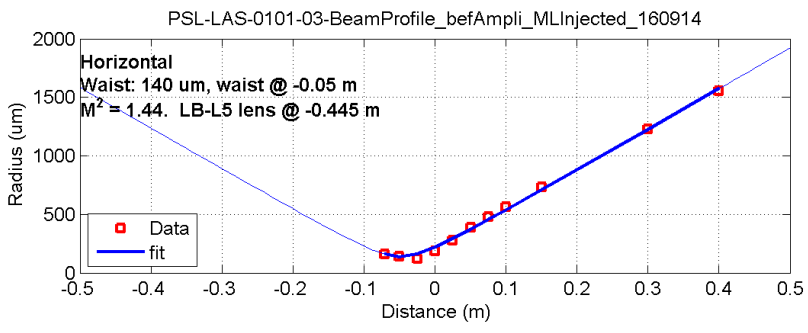
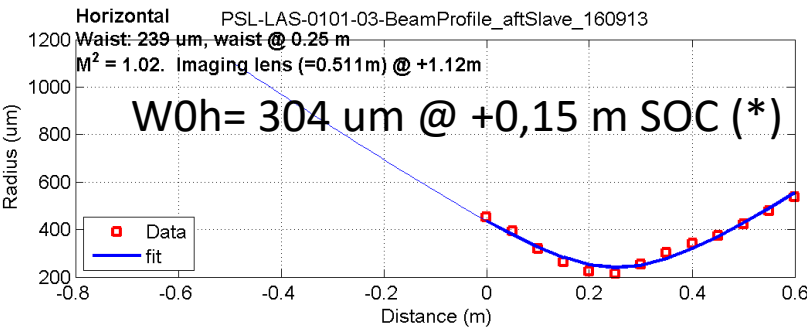
## □ 60 W amplifier

All the four pumping diodes were swapped with new ones (logentry 34745)

- the diodes were found compliant with the specifications
- we work around to find the best configuration according to the PMC modal content  
-> config 50A / 37 A
- one needs to find the best configuration according to the Pstab dynamic (to be done)
- work done regarding the thermal instabilities (F. Carbognani & neoLASE & al, see Eric talk)

# Laser Bench rejuvenation (optical power) for O2

## □ beam profile @ slave output and amplifier input

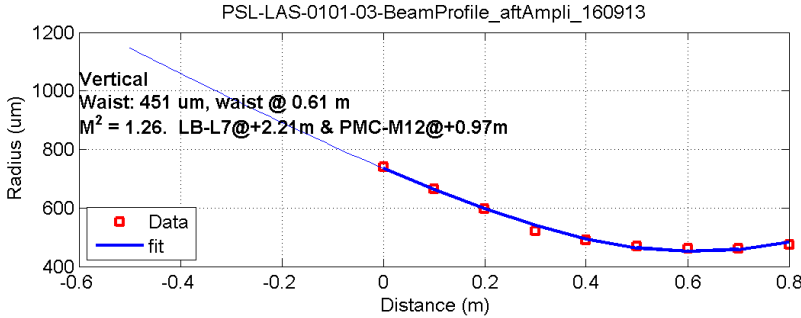
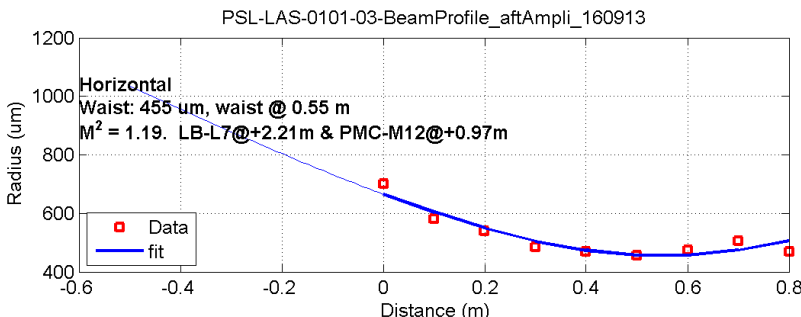


(\* ) SOC: Slave Output Coupler

- The beam profile is coherent with the nominal value @ slave output (cf slave user manual)
- The beam close to specifications @ amplifier input but with a "large  $M^2$ " parameter (meas. pb, thermal effect in the Faraday,...?)

# Laser Bench rejuvenation (optical power) for O2

## □ beam profile @ amplifier output



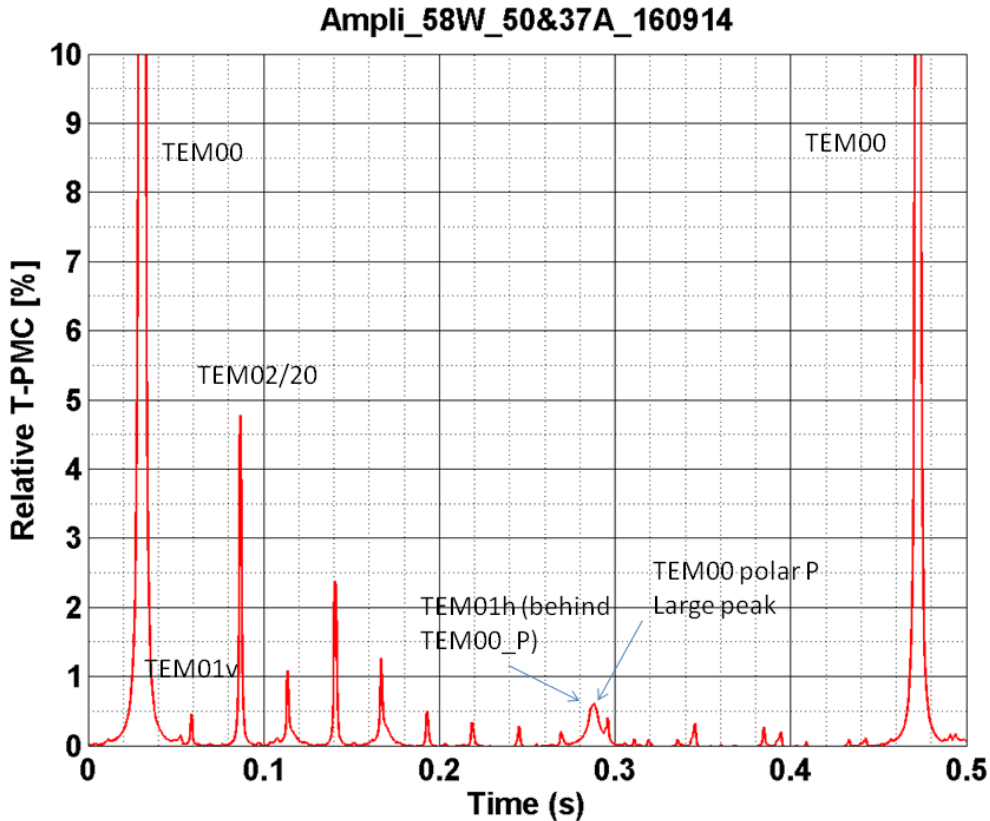
- Reasonable  $\sim 453 \mu\text{m}$  waists at 0,56 m from PMC input <sup>(5)</sup>  
-> it would lead to a 10 % mismatch with the PMC

<sup>(5)</sup>  $w0_{PMC} = 450/500 \mu\text{m}$

- with some high order mode structure, alignment dependant which may impact the modal content of the beam

# Laser Bench rejuvenation (optical power) for O2

□ Amplifier output modal content ( @ 58 W)

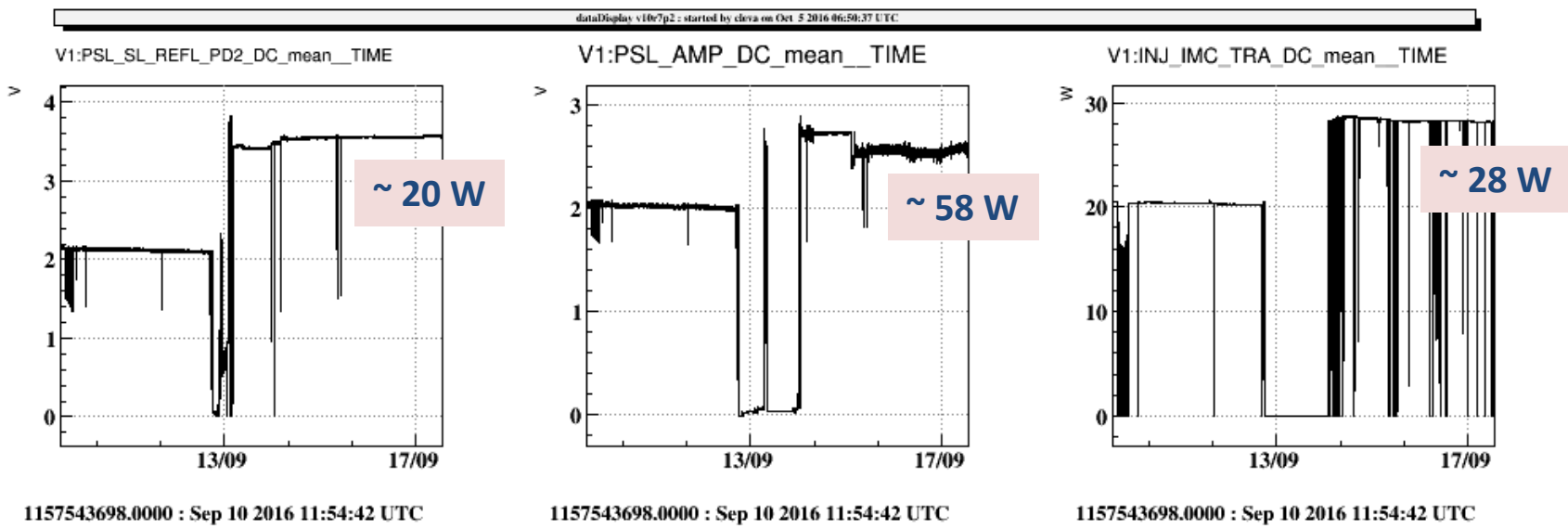


- ~ 5% mismatch (recoverable, ~2.9W)
- ~ 7 % high order mode



# Laser Bench rejuvenation (optical power) for O2

□ Power available



# Laser Bench rejuvenation (optical power) for O2

## □ Various

- an Optocad scheme is available for the fibered Master laser
- we check the LB power monitor dependency with Humidity & Temp (\*)

*(\*) see slide 11*

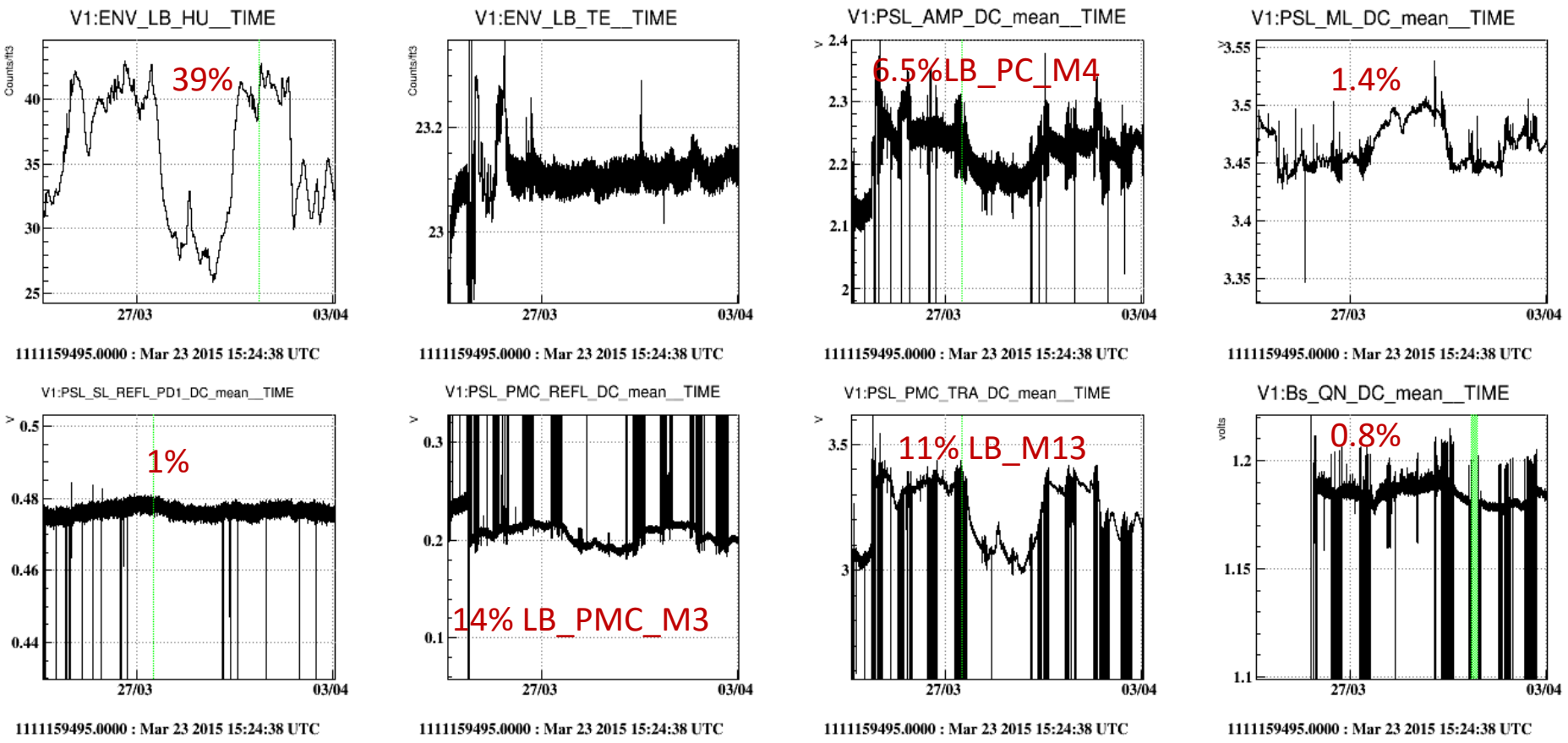
Humidity variation :	39 %
Master power Opt. Pow. Monit. <sup>(1)</sup> :	1,4 %
Slave power Opt. Pow. Monit. <sup>(1)</sup> :	1,0 %
Amplifier power Opt. Pow. Monit. <sup>(2)</sup> :	6,5 %
PMC <sup>(2)</sup> :	11/14%

<sup>(1)</sup>: provided by the LMA and tested for this specific issue

<sup>(2)</sup>: "standard" optics

# Laser Bench rejuvenation (optical power) for O2

dataDisplay v10r7p2 : started by hreibi on Oct 4 2016 14:58:49 UTC



# Laser Bench rejuvenation (optical power) for O2

□ what next ?

Although there remain some still open points regarding opt. matching & beam modal content, we stop our effort since the overall power at IMC output is high enough and move to higher priority tasks

- Pstab robustness diagnostic (Amplifier/slave pump configuration & electronic adjustments)  
-> off-line work
- Spare Pstab & IMC rampautos, on-site tuning
- fibered Master laser clipping curing