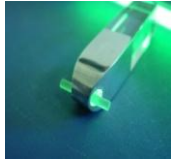


Department of Physics

## Renewable solar-powered lasers

**Solar-Pumped Laser Laboratory,**  
CEFITEC, FCT/UNL

<http://www.cefitec.fct.unl.pt/en/lasers>



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Ph.D. student

## Objectives

Our solar-pumped lasers laboratory was established to largely enhance both the collection efficiency and beam quality of present-day solar-pumped lasers. Renewable, powerful solar laser beam with the highest brightness is of great interests to many areas.

Powerful solar collector with the highest flux at its focus is also of great value to both material processing and laser emission.

## Methodology

High power Fresnel lenses, parabolic mirrors are used to both collect and concentrate incoming solar power to their focal spots, where novel secondary, tertiary concentrators are used to produce efficiently solar laser emission.

Recently, we have used a 1.0 diameter Fresnel lens, a fused silica concentrator, a 2D-CPC concentrator and finally a V-Shaped cavity to achieve a large advance in solar-pumped laser beam brightness. 2.3 W cw TEM<sub>00</sub> ( $M^2 \leq 1.1$ ) solar laser power is produced, attaining 1.9 W laser beam brightness figure of merit, which is 6.6 times higher than the previous record..

## Expected Results

Novel Lasers: Solar-Pumped Nd:YAG Lasers Getting Brighter

Our research on TEM<sub>00</sub> solar laser was reported by Senior Editor Gail Overton LASER FOCUS WORLD, World News, Dec. 9, (2013)

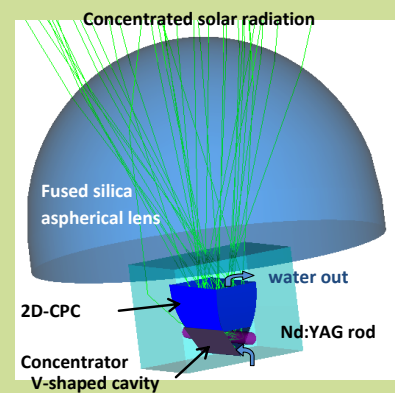
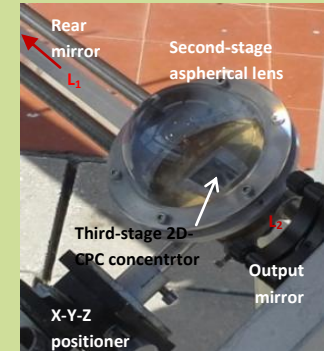
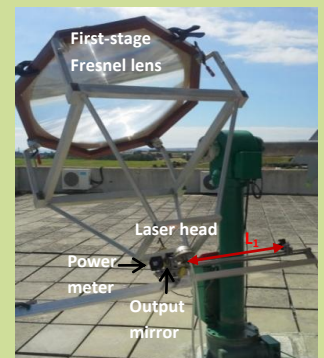
<http://www.laserfocusworld.com/articles/print/volume-49/issue-12.html>

Our publication "Side-pumped continuous-wave Cr:Nd:YAG ceramic solar laser" was selected as a Key Scientific Article contributing to excellence in energy research

Renewable Energy Global Innovations, Feb. 27, 2014

<http://reginnovations.org/key-scientific-articles/side-pumped-continuous-wave-crndyag-ceramic-solar-laser/>

<http://social.csptoday.com/technology/sfera-flushes-out-groundbreaking-csp-research>



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PTDC/FIS/122420/2010, PTDC/FIS/103599/2008