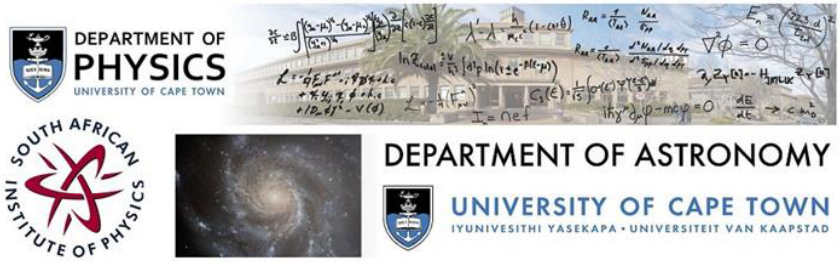

Contribution ID: **421** Type: **Oral Presentation**

The interaction of high power cw laser beams with weakly absorbing optical elements

Tuesday, 5 July 2016 11:10 (20 minutes)

Abstract content
   (Max 300 words)
Formatting &
Special chars

Laser Damage Threshold (LDT) data for Q-Switch lasers are readily available, whereas data on continuous wave (cw) and quasi-cw LDT are not. The LDT affects the choice of optics with regard to the material and the coatings which directly affect cost. In addition, even modest thermal lensing is also problematic since it causes a focus shift which dramatically changes the operating parameters of laser material processing applications. This paper will discuss investigations of determining LDT of high power cw laser systems as well as the effect of thermal lensing on optics and the interacting beam parameters.

We have tested a number of optics specifically designed for high power lasers. The simplest test involved exposing the optics to different power densities and inspecting them for damage. We were thus able to measure LDT for different optics in both a clean room environment and in an operational dusty environment. The thermal lens experiments were done in an industrial environment, and in this case dust and metal vapour played an important role in contaminations of optics. In the thermal lens experiments, each optical element was tested individually with power levels starting at 500 W to 5 kW using a high power cw laser. The materials tested were various types of Fused Silica as well as Sapphire.

The results quantify the thermal lensing of high-power laser radiation with weakly absorbing optical elements and indicates that certain optics were damaged at much lower LDT values than specified by their manufacturers. In addition it was found that even minute coating contamination leads to increased coating absorption which drastically increases thermal lensing and eventually causes laser damage.

Apply to be
 considered for a student
   award (Yes / No)?

No

Level for award
 (Hons, MSc,
   PhD, N/A)?

N/A

Main supervisor (name and email)
and his / her institution

N/A

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Mr RAMOKOLO, Rocky (CSIR, National Laser Centre)

Co-authors: Ms SINGH, Ann (CSIR,National Laser Centre); Mr PREUSSLER, DIETER (CSIR/NLC); Dr STRAUSS, Hencharl (CSIR (National Laser Centre))

Presenter: Mr RAMOKOLO, Rocky (CSIR, National Laser Centre)

Session Classification: Photonics

Track Classification: Track C - Photonics