International Conference on Space Optics—ICSO 2012

Ajaccio, Corse

9–12 October 2012

Edited by Bruno Cugny, Errico Armandillo, and Nikos Karafolas

Qualification of laser optics for upcoming ESA space laser missions

Wolfgang Riede

Paul Allenspacher

Alessandra Ciapponi

Helmut Schröder

et al.

International Conference on Space Optics — ICSO 2012, edited by Bruno Cugny, Errico Armandillo, Nikos Karafolas
Proc. of SPIE Vol. 10564, 105642K · © 2012 ESA and CNES · CCC code: 0277-786X/17/\$18 · doi: 10.1117/12.2309267

Proc. of SPIE Vol. 10564 105642K-1

Qualification of laser optics for upcoming ESA space laser missions

Wolfgang Riede,^{1,*} Paul Allenspacher,¹ Alessandra Ciapponi,¹ Helmut Schröder,¹ Denny Wernham,² Fabio Era,³ Dominique Thibault,⁴

¹*Institute of Technical Physics, Deutsches Zentrum für Luft- und Raumfahrt, Pfaffenwaldring 38-40, 70569 Stuttgart, Germany*

²*European Space Agency (ESA/ESTEC), Keplerlaan 1, 2201 Noordwijk, Netherlands*

³*SELEX Galileo S.p.A., Campi Bisenzio (FI) – Italy*

⁴*ASTRIUM 31, Avenue des cosmonauts, Toulouse – France*

*Corresponding author: Wolfgang.Riede@dlr.de

As a consequence of the ongoing interest for deployment of laser systems into space, suitable optical components have to be developed and must be extensively space qualified to ensure reliable, continuous, and autonomous operation. The exposure to space environment can adversely affect the longevity of optics, mainly coatings, and lead to system degradation.

An increased operational risk is due to the air-vacuum effect, which can strongly reduce the laser damage resistance of optical coatings. For this purpose, a vacuum laser damage test bench has been developed and is operated at the DLR laser labs. In extensive test campaigns, all damage-prone optics of the ALADIN laser system (being the laser source of the upcoming ESA ADM Aeolus mission) were tested under operative conditions at the fundamental and at the harmonic wavelengths of Nd:YAG. Related scientific aspects like air-vacuum effect and transient pressure sensing techniques have been investigated.