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## *Qualification of laser optics for upcoming ESA space laser missions*

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# Qualification of laser optics for upcoming ESA space laser missions

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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.