

PRESS RELEASE

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Application offensive for ultrafast lasers in the kW range

Experts from 13 different Fraunhofer institutes are working on the development of multi-kW ultrafast lasers and various applications in the Fraunhofer Cluster of Excellence Advanced Photon Sources CAPS. A user facility with application laboratories in Aachen and Jena is being created for this purpose, laboratories in which partners from industry and research can work with the new technology.

Among experts, ultrafast (USP) lasers have long been an insider tip: They can process almost any material and are characterized by the highest precision during ablation. However, the systems in the market still do not have enough power to serve many applications with high throughput requirements.

By initiating the Fraunhofer Cluster of Excellence Advanced Photon Sources CAPS, the Fraunhofer-Gesellschaft has set out to change this sustainably. From the Fraunhofer Institute for Laser Technology ILT in Aachen, Hans-Dieter Hoffmann puts it in a nutshell: "We want to combine the precision of the USP laser with the surface throughput of modern cutting and welding lasers".

For this purpose, the cluster will initially advance the development of laser sources. While the Fraunhofer ILT engineers are working on slab and disk lasers, Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena will focus their attention on fiber lasers. "We have now reached 3.5 kW and want to scale the system up to 10 kW this year", says Professor Jens Limpert from Fraunhofer IOF. Limpert and Hoffmann manage the the central office of the cluster.

Application laboratories will start in 2019

Laser source development is, however, only a first step. Fraunhofer CAPS is designed in such a way that the institutes are also researching compatible process technology and applications at the same time. Partners from science and industry are invited to participate. For them, the cluster acts as a virtual institute in which the experts from the 13 Fraunhofer institutes – FEP, IAF, IIS, IKTS, IMWS, ISE, ISIT, ITWM, IWM, IWS, IZI and ILT and IOF – offer their combined expertise.

Presently, the facilities of the first application laboratory in Aachen are being completed for application development with multi-kW ultrafast lasers. The official inauguration will take place on September 18, 2019, coinciding with the opening of the Research

Editorial Notes

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Center Digital Photonic Production (RCDPP) of RWTH Aachen University. The application laboratory in Jena will open in the fourth quarter of 2019.

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In addition to the multi-kW ultrafast laser sources, the jointly developed system technology is available in the application laboratories. There, engineers will explore applications in four future fields: production, imaging, materials and fundamental science. The goal is to bring together the various expertise in the areas of laser sources, process technology and application in such a way that the partners can create competitive concepts that also fit into the vision of a digitized factory.

The advantages of the new ultrafast lasers are evident, for example, in the large-area machining of ultra-hard materials. Thus, diamond-composite ceramic pipes for use on the seabed can be processed precisely and quickly with the laser. Other examples are photovoltaic or battery manufacturing, where the USP laser can drill and pattern quickly and accurately.

In addition to the kW sources in the infrared, coherent radiation in the EUV range will also be generated in Aachen and Jena. The user facility in Jena is dedicated to provide unprecedented coherent EUV power. This is especially interesting in the future field of imaging. Coherent EUV radiation can be used to image biological or semiconductor structures in the nanometer range, for example, to analyze defects on lithography masks in chip production.

Fraunhofer CAPS at the LASER World of PHOTONICS

The experts from the Fraunhofer-Gesellschaft will be presenting how they bring precision and speed together in this cluster at the LASER trade fair in Munich from June 24 to 27 at the joint Fraunhofer booth No. 431 in Hall A2. The booth will show how high precision and high productivity with ultrafast lasers work in large-scale machining on an aircraft wing of industrial partner Sonaca. In addition, a multi-pass cell will be on display as an eye-catcher, with the help of which the pulse durations of high-performance ultrafast lasers can be efficiently shortened.

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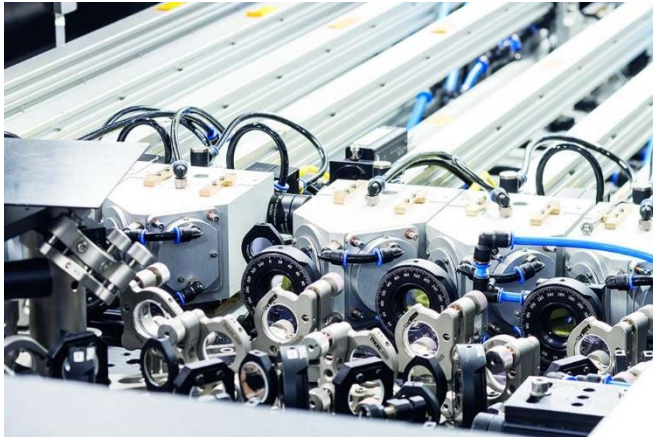


Image 1:
The scaling of the multi-kW ultrafast fiber laser is based on the coherent combination of several individual beams.
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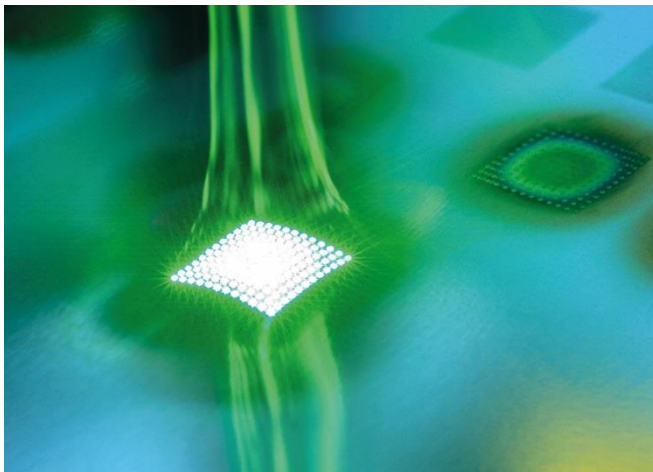


Image 2:
With multi-beam optics, the high laser powers can be used efficiently.
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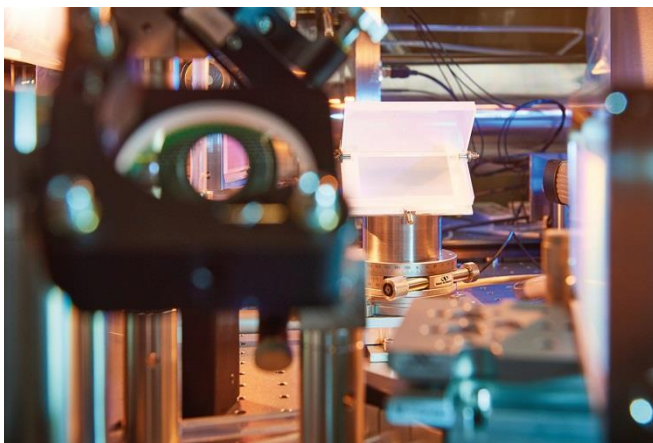


Image 3:
While the lasers continue to be scaled, the users have identical kW sources available in the application laboratories.
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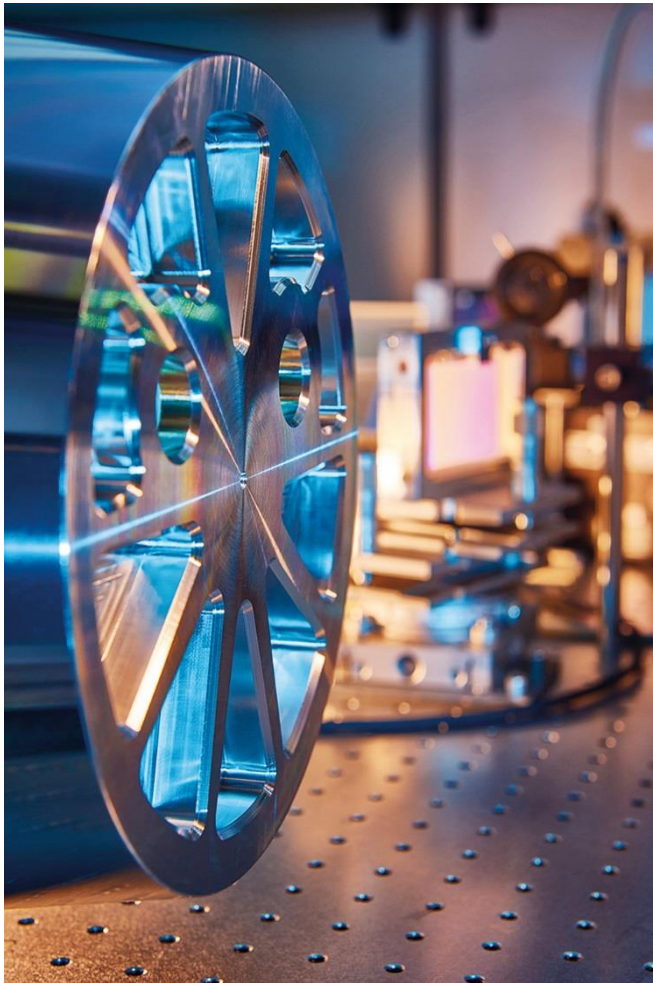


Image 4:

As part of Fraunhofer CAPS, the power of the USP laser is to be scaled to more than 10 kW.

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The **Fraunhofer-Gesellschaft** is the leading organization for applied research in Europe. Its research activities are conducted by 72 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of more than 26,600, who work with an annual research budget totaling 2.6 billion euros. Of this sum, almost 2.2 billion euros is generated through contract research. Around 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

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