

# PRESS RELEASE

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**PRESS RELEASE**June 26<sup>th</sup> 2017 || Page 1 | 4  
-----**LASER World of PHOTONICS 2017**

## **Fraunhofer IOF presents encryption technology for interception-free communication for the first time**

**In the near future, quantum cryptography will be an important issue for the secure transfer of communication. The feasibility of quantum technology could only be proven in research labs so far - now the idea is to be transferred from laboratories to the real world. Experts of the Fraunhofer-Institute for Applied Optics and Precision Engineering IOF in Jena have succeeded in providing an encrypted photon source for space applications. These and many other developments are presented from June 26 to 29, 2017 at the LASER World of Photonics in Munich.**

Scientists from the Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena have developed a stable, aerospace suitable source for entangled photons. Such connected or "entangled" photons are to be used in the future in secure encryption technologies. A series of photons are sent from a photon source via fiber lines or free space to one or two receivers and then converted to decrypt the message. A first satellite mission is planned.

This process is called quantum key distribution (QKD). The QKD technology is to be part of a new generation of space-based laser systems that enable fast and, above all, safer communication between satellites as well as between satellites and ground stations. Erik Beckert from the Fraunhofer IOF explains: "A listening-off on the one hand leads to a change of both photons and is verifiable. This makes quantum communication safer than other technologies, since you can always see if a third party is listening. "The photon source developed at Fraunhofer IOF will be presented for the first time this year at the LASER World of Photonics.

### **Scattered light measurement for surface analysis**

A further development of Fraunhofer IOF in the area of optical systems is a sensor for scattered light measurement. In order to make optimum use of the new possibilities of compact stray light sensors, this was combined with a collaborative and interactive robot. Together with newly developed software modules, this system allows the sensor to be guided over complex shaped surfaces with diameters of up to one meter. For example, these surfaces can be mapped over their entire area with regard to their roughness. The collaborative features of the robot with the integrated protection

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**Editorial Notes**

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mechanisms keeps the degree of safety precautions low and thus even enable mobile use. At the same time, it is possible to align the sensor manually with selected sample positions and to register the results obtained into a surface map.

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### **Additive manufacture of lightweight mirrors**

Also on the subject »Additive Manufacturing« we introduced a new technology. Selective laser melting allows the creation of complex geometries directly from 3D CAD data. For this, a CAD model is read into the production machine and built up layer by layer of metal powder - for example, aluminum. The powder is fused with the help of a powerful laser. The structures which can be produced are almost arbitrary, in contrast to conventional machining processes.

Metal optics can be significantly reduced in weight using this method. In the interior of the mirror material can be reduced in areas which do not contribute to the stability. This allows for extremely light optics, which nevertheless have a high stability. Applications for weight-reduced mirrors are found in laser material processing and especially in optical instruments for space applications.

These and many other exhibits, such as free-form optics or high-performance components for fiber lasers, can be found at the joint Fraunhofer booth at the LASER World of Photonics, Munich, Germany, Hall B3 / Booth 327 from June 26 to 29, 2017. We would also like to invite you to participate in our event and lecture program.

### **Monday (June 26<sup>th</sup> 2017)**

**12.00 – 12.20**

Forum Hall B3

**Talk: Joining technologies for optical and laser materials**

Carolin Rothhardt

**13.00 – 13.20**

Forum Hall B3

**Talk: Quick focus-shifting mirrors for laser material processing**

Dr. Claudia Reinlein

**14.20 – 14.40**

Forum Hall A3

**Talk: Additive manufacturing of metal optics**

Dr. Nils Heidler

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**Tuesday (June 27<sup>th</sup> 2017)**

**13.40 – 14.40**

Forum Hall B3

**Awarding of the Green Photonics Young Talent Award**

**14.40 – 17.00**

Forum Hall B3

**Application Panel: Pico-and Femtosecond Lasers and Beam Delivery**

**Wednesday (June 28<sup>th</sup> 2017)**

**11.00 – 12.20**

Forum Hall B3

**Application Panel: CW (and Long-Pulse) Diode Pumped Solid State Lasers, Fiber Lasers and Beam Delivery**

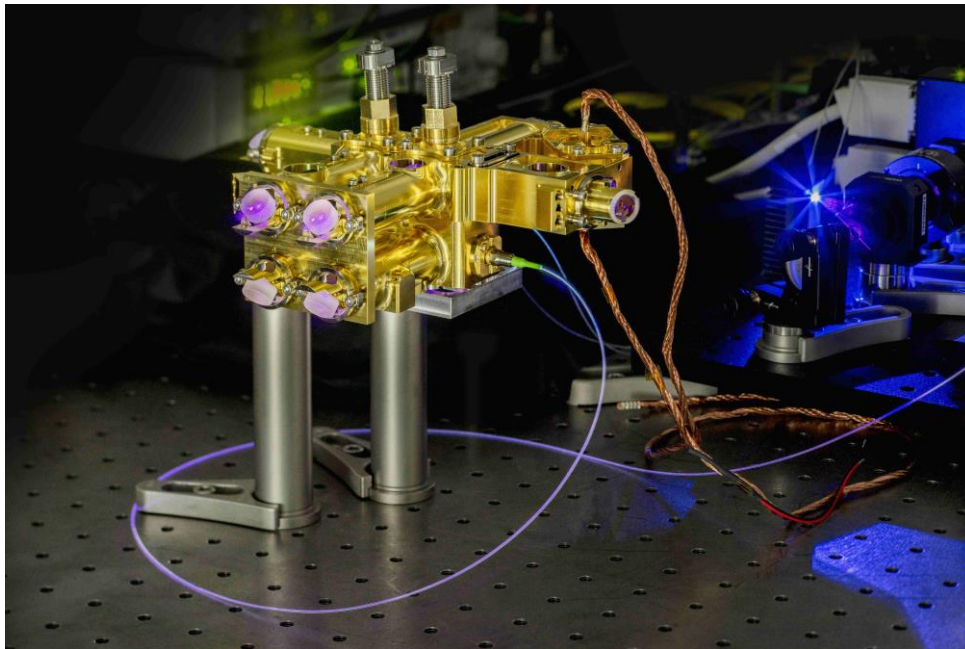


Image 1) Activated entangled photon source which is fed only by a fiber laser signal and transmits two twin photons through separate fiber connections. (©Fraunhofer IOF)



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Image 2) Robot-supported scattered light measurement. (©Fraunhofer IOF)



Image 3) UP-machining of an additive manufactured light weight mirror. (©Fraunhofer IOF)

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