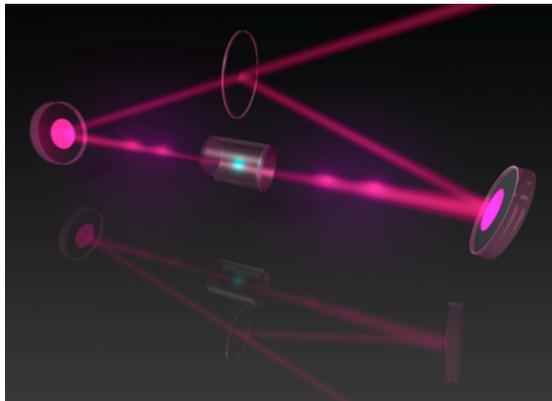


**PhD positions in optics/ quantum physics /precision spectroscopy / photonics in the group of Dr. Nathalie Picqué at the Max-Planck Institute of Quantum Optics near Munich, Germany**



**“Precision spectroscopy of small molecules for tests of fundamental physics”**



Precision spectroscopy is a powerful tool for testing fundamental laws of physics and quantum molecular theory. Our group has developed a technique based on laser frequency combs, that uniquely combines very high spectral resolution (Doppler-free), broad spectral bandwidth and sensitive detection at low light levels. Evaluating the systematic effects induced by the new technique, extending the technique to new spectral territories, applying the technique to the spectroscopy of small molecules are the new challenges to tackle.

### **Profile of the Candidate**

Typical applicants will have a strong background in physics, with previous training in atomic, molecular and optical physics. They must hold a Master's degree (or a degree that is equivalent in level) when starting their doctoral thesis. The project is primarily experimental, and first experience in research areas such as optical frequency combs or precision spectroscopy would be an advantage. Basic knowledge in atomic/molecular physics will also be an asset. Applicants need to be highly proficient in spoken and written English. The main requirement is a passion for challenging experiments and for precision measurements, as well as motivation for exploring new frontiers of fundamental physics.

This position for a doctoral thesis is available immediately and will remain open until filled. Starting dates anytime in 2021 are possible. There are no citizenship/residence requirements for this position.

### **Work Environment**

The position will be based at the Max-Planck Institute of Quantum Optics in Garching near Munich (Germany). The working language at the Institute is English. We offer stimulating working conditions in a small and creative research group. Our laboratories are equipped with state-of-the-art instrumentation. The Max-Planck Institute of Quantum Optics provides a world-class scientific environment with outstanding scientists and visiting scholars. The project involves occasional travelling to conferences and workshops and international collaborations with research groups, who are amongst the leaders in their field.

**Enquiries and applications** should be addressed to Dr. Nathalie Picqué (nathalie.picque@mpq.mpg.de) and should contain a curriculum vitae, a list of publications (if applicable), a short motivation letter (explaining why the applicant would like to join our group and indicating his/her desired starting date), transcripts of undergraduate and graduate grades (with ranking if possible) and the contact details of at least one scientist (e.g. supervisor of Masters' project) who knows well the candidate and who is able to provide a recommendation letter. Even for pre-application inquiries, we strongly encourage potential applicants to always send a full application file, as this helps answering the questions by the candidates.

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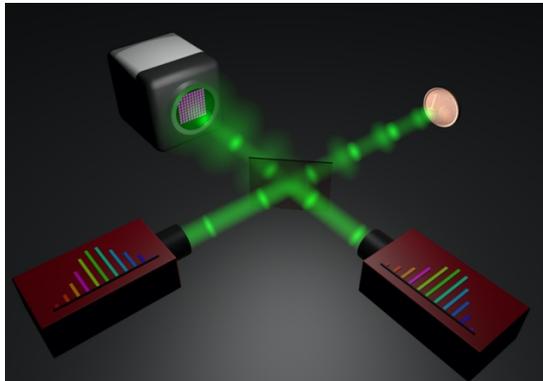
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## **“Digital holography and 3D-imaging”**



Three-dimensional imaging is a hot topic relevant to many fields of science and technology, from bio-medicine to metrology at the nanometer scale. Our group has recently demonstrated the feasibility of an intriguing new approach to scan-less three-dimensional imaging, which combines laser frequency combs and digital holography. It promises wavefront sensing at many optical frequencies simultaneously with unprecedented precision. Exploring other -more powerful- schemes to 3D-imaging with frequency combs, determining the frontiers of precision and accuracy of the new techniques, implementing their first applications are now at the heart of a new project of dimensional metrology.

### **Profile of the Candidate**

Typical applicants will have a strong background in physics, applied physics or optical engineering, with previous training in optics, laser physics or optoelectronics. They must hold a Master's degree (or a degree that is equivalent in level) when starting their doctoral thesis. The project is primarily experimental, and first experience in research areas such as optical frequency combs or ultrafast lasers would be an advantage. Computer-programming skills (such as interfacing laboratory instruments) will also be an asset. Applicants need to be highly proficient in spoken and written English. The main requirement is a passion for challenging experiments and desire to learn advanced techniques at the state-of-the-art of frequency comb technology.

This position for a doctoral thesis is available immediately and will remain open until filled. Starting dates anytime in 2021 are possible. There are no citizenship/residence requirements for this position.

### **Work Environment**

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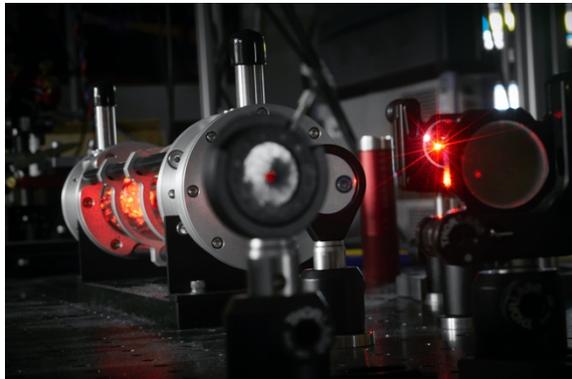
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## **“Quantum-enhanced interferometry”**



Our group explores new approaches to interferometry using frequency combs. Within a project supported by the Munich Center for Quantum Science and Technology, we evaluate new strategies involving quantum optics and quantum physics. We associate modern tools of photonics and nano-photonics and of quantum measurements for novel interferometry and spectroscopy down to single molecules and nano-particles. Applications range from nanoscopic quantum emitters to molecular samples of biological relevance to precision spectroscopy.

### **Profile of the Candidate**

Typical applicants will have a strong background in physics, with previous training in atomic, molecular and optical physics or in quantum physics. They must hold a Master's degree (or a degree that is equivalent in level) when starting their doctoral thesis. The project is primarily experimental, and first experience in research areas such as optical frequency combs or precision measurements would be an advantage. Basic knowledge in atomic/molecular physics will also be an asset. Applicants need to be highly proficient in spoken and written English. The main requirement is a passion for challenging experiments and motivation for exploring new frontiers of fundamental physics.

This position for a doctoral thesis is available immediately and will remain open until filled. Starting dates anytime in 2021 are possible. There are no citizenship/residence requirements for this position.

### **Work Environment**

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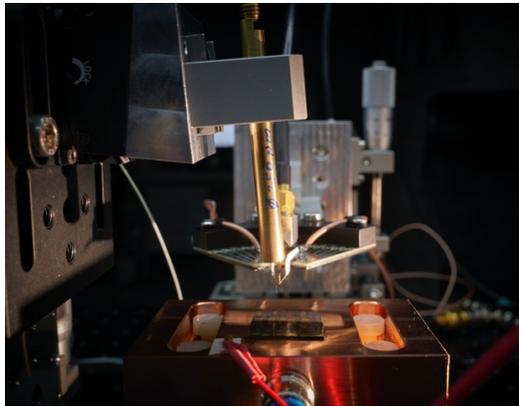
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**PhD positions in optics/ quantum physics /precision spectroscopy / photonics in the group of Dr. Nathalie Picqué at the Max-Planck Institute of Quantum Optics near Munich, Germany**



**“Frequency comb spectrometer on a photonic chip”**



Within the Innovative Training Network MICROCOMB, our group explores new strategies to spectrometers on photonic chips. Laser frequency combs have revolutionized time and frequency metrology and are becoming enabling tools in many other applications. Our group has leading expertise in developing and using them for interferometry and high-resolution spectroscopy over broad spectral bandwidth. Frequency comb generators on a chip are an emerging technology which holds much promised for highly miniaturized instruments. The proposed work consists in evaluating the most promising technologies for selected applications and in developing new interferometers and new spectrometers based on state-of-the-art frequency comb generators on photonics chip.

**Profile of the Candidate**

Typical applicants will have a strong background in physics, applied physics or optical engineering, with previous training in optics, laser physics or optoelectronics. They must hold a Master's degree (or a degree that is equivalent in level) when starting their doctoral thesis. The project is primarily experimental, and first experience in research areas such as optical frequency combs or ultrafast lasers would be an advantage. Basic knowledge in analog and digital electronics and/or in atomic/molecular physics will also be an asset. Applicants need to be highly proficient in spoken and written English. The main requirement is a passion for challenging experiments and desire to learn advanced techniques at the state-of-the-art of frequency comb technology.

The position for this project is within the Innovative Training Network MICROCOMB. There are no citizenship requirements but applicants must not have resided or carried out their main activity (work, studies, etc.) in Germany for more than 12 months in the past 3 years. This position for a doctoral thesis is available immediately and will remain open until filled. Starting dates anytime in 2021 are possible.

**Work Environment**

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