**OPTICS DEPARTMENT**
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FEMTO-ST Institute, Optics Department

Optoelectronics and Photonics research Group (Prof. J. M. Dudley)

University of Franche-Comte and CNRS, Besancon, France

## 2 OPEN POSTDOCTORAL POSITIONS

**fixed term 1 year, start as soon as possible**

- **Ultrafast Optics, nonlinear ultrashort pulse propagation, filamentation**
- **Femtosecond laser ablation**

The Optoelectronics and Photonics research group of FEMTO-ST has an internationally recognized expertise in ultrafast nonlinear photonics and has recently developed a novel research theme concerning the nonlinear propagation of femtosecond nondiffracting Bessel and Airy beams. 2 postdoc positions (1 year) are open in this area to carry out respectively fundamental and applied research. A summary of the project and references are provided below.

The research will be carried out within the CNRS FEMTO-ST Institute providing access to a wide range of basic science and technological facilities including a suite of dedicated photonics laboratories, 800 $m^2$ of clean rooms, and advanced characterization facilities.

Besancon is in the East of France, 2.5 hours from Paris by train and is near to the foothills of the Jura mountains, close to excellent hiking trails and ski stations. It is consistently rated as having one of the highest qualities of life in France and has a vibrant university atmosphere.

**Salary**: ~2000-2400€ per month depending on experience.

**Required qualifications:**

No restrictions of citizenship apply.

The candidate must hold a PhD in physics or engineering.

Essential skills: demonstrated expertise in experimental ultrafast nonlinear optics and ultrafast lasers. The candidate also must have excellent communication skills and the ability to work in our highly collaborative team environment.

**To apply**

For more information or to apply, please contact:

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## PROJECT SUMMARY

High-intensity nonlinear optics using ultrashort laser pulses has dramatic impact in a wide range of fields in fundamental and applied physics. Aside from the intrinsic scientific interest in developing an improved understanding of intense light-matter interactions, there are many important applications such as remote spectroscopy, lightning control, terahertz wave generation, pulse compression and laser material processing. The overall context of the project builds on recent results that have seen the emergence of an exciting new area of research in this field involving the extreme nonlinear propagation of “non-diffracting beams” where the intense light-matter interaction can be sustained over greatly increased propagation distances. The possibility to study extreme nonlinear propagation in this regime has motivated intense research on the international level.

The specific aims of the project relate to the development of a combined experimental and numerical program of research that will extend the detailed study of nonlinear propagation of non-diffracting beams to the micrometric transverse dimension for the first time, and that will apply these results to develop novel practical applications of femtosecond laser nanomachining to photonic components.

## References

[1] “Sending femtosecond pulses in circles: highly non-paraxial accelerating beams”, F. Courvoisier et al, *Optics Letters*, 37, 1736-1738 (2012)

[2] “Arbitrary accelerating micron-scale caustic beams in two and three dimensions” L. Froehly, et al, *Optics Express*, 19, 16455-16465 (2011)

[3] “High aspect ratio nanochannel machining using single shot femtosecond Bessel beams” M. K. Bhuyan et al, *Applied Physics Letters*, 97, 081102 (2010)