

**Light with a twist: opportunities and challenges.** Juan P. Torres, ICFO (Spain).

## **ABSTRACT**

The generation, use and detection of photons with peculiar spatial shapes, such as light beams that possess orbital angular momentum, has been extensively studied during the last years, since the use of the spatial degree of freedom of light has been shown to offer new opportunities for exploring nature, and developing new technology, both in the realm of the very small (atoms) as well as in the realm of the very big (stars). The spatial shape of light turns out to be an enabling tool, with applications in other areas of science and technology where the use of light can lead the exploration of uncharted territories that are still beyond of our current understanding, or advance the use of techniques still not demonstrated. The spatial shape of light joins in this way the use of the other degrees of freedom that characterize light: the polarization, the energy and the spectrum. The use of the spatial degree of freedom also poses new challenges that scientists and engineers try to surmount with new ideas and implementations. In this talk we discuss both the opportunities and the challenges, reviewing different applications in science and technology where light beams with properly engineered spatial shapes play a non-trivial role essential to achieve the objectives of the application.