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The orbital angular momentum of light

The main purpose of this talk is to highlight that light can have a much more complex structure than what astronomers have always considered, and therefore can transport much more information.
Electromagnetic radiation carries energy and momentum. Usually, associated to the momentum carried by light is the *linear momentum*, responsible for the radiation pressure and associated to a force action. Another component of the momentum is the *angular momentum,* which is associated to a torque action and which can be approximated under certain circumstances to the vectorial sum of the *spin angular momentum* and the *orbital angular momentum (OAM).* The spin angular momentum is the well-known component of the angular momentum, connected to the polarization. Recent studies gave evidence also to the importance of the orbital angular momentum of light, which is associated to a helicoidal shape of the wave front. This new observable of the electromagnetic field finds several applications both in experimental and in theoretical physics and astrophysics, opening new scenarios to astronomy. The study of the OAM as a new observable for astronomers could give additional information with respect to those already inferred from the analysis of the intensity, frequency and polarization of light, in particular about massive and rotating objects such as Kerr black holes, and inhomogeneous plasmas traversed by photons.