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Gravitational properties of laser light

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The properties of light are premises in the foundations of modern physics: they were used to derive special and general relativity and are the basis of the concept of time and causality in many alternative models. Therefore, it is worthwhile to study the back-action of light on the gravitational field with its rich phenomenology, even though the effects are in general very weak. In this talk, an overview is given of the gravitational properties of light, in particular, of laser pulses and focused laser beams with well-defined angular momentum. The time-dependence in the case of a laser pulse enables the investigation of the formation of the gravitational field of light. The stationary case of the gravitational field of a focused laser beam shows effects of the fundamental wave properties of light. I will also present results on the effect of angular momentum of light: frame dragging, the gravitational Faraday effect and gravitational spin-spin coupling of light.

Primary author: RÄTZEL, Dennis (Humboldt Universität zu Berlin)

Presenter: RÄTZEL, Dennis (Humboldt Universität zu Berlin)

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