# Generation of optical Schrödinger "cat" and entangled light states using intense laser-atom interactions

**P. Tzallas**[1,2*]

[1.] *Foundation for Research and Technology-Hellas, Institute of Electronic Structure & Laser, GR- 70013 Heraklion (Crete), Greece.*
[2.] *ELI-ALPS, ELI-Hu Non-Profit Ltd., Dugonics tér 13, H-6720 Szeged, Hungary*

[*] E-mail: ptzallas@iesl.forth.gr

Strong laser physics (SLP) and quantum-optics (QO), are two research directions founded on the classical and quantum description of the electromagnetic radiation, respectively. SLP has led to fascinating discoveries ranging from particle acceleration to attosecond science. On the other hand, QO has opened the way for groundbreaking achievements in quantum technology (QT) advancing studies ranging from fundamental test of quantum theory to quantum information (QI) processing. Despite the progress, until recently SLP and QO remained disconnected. This is because, the majority of the interactions in SLP were successfully described by semi-classical approximations treating the electromagnetic field classically, as there was no need to include the quantum properties of the field to explain the observations.

Here, I will present how we have recently managed to connect SLP and QO and build the foundations for the development of a new class of non-classical light sources for applications in QT. Specifically, I will discuss how fully quantized approaches and conditioning operations in strongly laser driven atom and HHG process, can be used for the generation of optical Schrödinger "cat" states and entangled light states with controllable quantum features [1-5]. The findings open the way for a numerous of new investigations stemming from the symbiosis of SLP, QO and QI science.

**References**

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