

CLEO-Europe/EQEC Short Course:

Practical Quantum Optics 2021

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The course has three parts: (1) introduction to field quantization from an experimental perspective and answering the question “What does it mean if optics is quantum?”; (2) description of quantum optical experiments with discrete and with continuous variables with special emphasis on Wigner functions in phase space and the special role of the quantum measurement process; (3) In the third part we address the question: “Is hard core quantum optics solely concerned with the study of fundamental physics questions or is it also useful for practical applications? The course will discuss quantum aspects in optics using phenomenological approaches whenever possible and mathematical description whenever necessary. The generation, propagation and detection of quantum light is one central topic. Practical quantum optics is all about noise, noise reduction and overcoming established sensitivity limits in interferometry, imaging, communication and sensing. Emphasis is put on practical considerations. Possible limits and opportunities that quantum effects may impose on applications in industry in the foreseeable future will be discussed. One of these opportunities is quantum computing with photonics, which is currently attracting much attention.

The course is designed to appeal to an audience without prior experience in quantum optics as well as to researchers who want to refresh and be updated with current trends.