



Project number	MSCA-ITN-2014-ETN 641272
Project title	High-intensity coherent nonlinear optics (HICONO)
Title	Fellow's report on activities : Workshop on "Control of Quantum Dynamics of Atoms, Molecules and Ensembles by Light" (June 2017, Nessebar/Bulgaria)
Report status & date	Version 1 (05.07.2017)
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We attended the annual workshop on "Control of Quantum Dynamics of Atoms, Molecules and Ensembles by Light" ([CAMEL 13](#)), which offered scientific talks on issues relevant to our individual research projects in HICONO. The meeting brings together colleagues with background in quantum optics, coherent control, atomic physics, physical chemistry, and high-intensity, ultra-fast laser physics. The workshop was organized by Prof. N.V. Vitanov (Univ. Sofia), who is also member of the advisory board of external experts in HICONO. It was attended by members from several HICONO teams.

Goal : During the workshop we learned about a variety of important issues in coherent light-matter interactions, e.g. novel concepts to efficiently and robustly control quantum systems, or about new experimental developments to enhance harmonic generation.

Impact : We note, that the workshop is rather focussed and small (i.e., with roughly 40 attendees) compared to big conferences. However, it provides an audience with many of the main actors on the previously mentioned fields of research. An audience of colleagues from all around Europe, the United Kingdom and even overseas to which disseminate our research and progress on the lines of the HICONO project.

Methodology : Both of us gave oral presentations for the scientific community at CAMEL : K. Zlatanov talked about adiabatic generation of superposition states by adopting exact analytical models, with potential applications to support nonlinear-optical frequency conversion at moderate intensities and harmonic order, e.g. in third-harmonic generation.



X. Laforgue talked about enhancement of harmonic generation through the usage of multi-photon resonances, presenting an experimental and theoretical extensive study on the matter of realizing the generation of fifth harmonic radiation in an Argon-filled waveguide. While hollow-core waveguides have been broadly implemented for an ample spectrum of applications, the efficiency enhancement that can be achieved by tuning the fundamental radiation to the vicinity of a resonance had not been explored. The exhaustive investigation on attaining the advantages of phase-matched frequency conversion and combining them with the resonance enhancement was the core message of the presentation and the issue of the extensive following discussions during the meeting.



The size of the workshop and varied backgrounds of the attendees enabled young researchers to have ample opportunities for lively and extended discussions with all other participants and speakers.