Co.R.I. PROJECT COURSE ANNOUNCEMENT

Prof. Dimitris Charalambidis, Emeritus at the Department of Physics, University of Crete, member of FORTH-IA (https://www.iesl.forth.gr/), Heraklion (Crete, Greece), Chief Scientific Advisor at ELI-ALPS https://www.eli-alps.hu/), (Szeged, Ungheria), will hold a short course on "Physics and Technology of Femto and Attosecond Lasers", within the activities of a UniPa Co.R.I. Project 2024 (Azione D3). Prof. Charalambidis is also co-chair of the forthcoming International Symposium on Ultrafast Intense Laser Science, which will be held in Palermo, 14-19 September 2025 (ISUILS2025, https://www.isuils.jp/2025/index.html).

Schedule will be as follows:

- Tuesday, 8 April 2025, 15:00-18:00.
- Thursday, 10 April 2024, 15:00-18:00.
- Monday 14 April 2025, 15:00-18:00.

Venue will be Viale delle Scienze, Edificio 6 (ex D.I.N.), 2nd Floor, "Aula Didattica". A list of topics is attached.

Moreover, on 7, 9, and 11 April, from 10:00 to 13:00, Prof. Charalambidis will be available for further discussions with graduate and PhD students on fs laser technologies and their applications and on research and job opportunities at the European Research Infrastructure (Edificio 6, ex D.I.N., 2nd Floor, Room 2026).

Students of the LM Electronics Engineering who will attend the lectures will receive 0.5 CFU per seminar, upon presentation of a brief report for each seminar attended. Students of other programmes may apply for credits, according to the rules of their own study programme.

For further information please contact Prof. Salvatore Basile (tel.: 09123899064, email: salvatore.basile@unipa.it).

PHYSICS & TECHNOLOGY OF FEMTO & ATTOSECONDS LASERS

Dimitris Charalambidis
University of Crete/FoRTH-IA/ELI-ALPS

1) Introduction to fs pulses.
2) Linear propagation - Dispersion and dispersion control.
3) Non-linear propagation and processes.
4) Mode-locking.
5) Kerr Lens Mode-locking.
6) Optical parametric oscillation/amplification.
7) Chirped Pulse Amplification.
8) Temporal characterization of pulses.
9) Introduction to laser matter interactions. Regimes, processes, dynamics.
10) Introduction to attosecond pulses. The three step model. Generation of high order harmonics. The synthesis of attosecond pulse trains.
11) Propagation effects phase matching. Limitations on the emitted XUV pulse energy. Generation of intense attosecond radiation.
12) Generation of isolated attosecond pulses. Generation by few cycle pulses. Polarization gating.
13) IR-XUV cross-correlation temporal characterization techniques of attosecond pulse trains and isolated pulses.
14) XUV autocorrelation techniques and the XUV-pump-XUV-probe experiments.
15) Selected examples of IR-XUV pump-probe and XUV-XUV pump-probe experiments.
16) Introduction to the ELI-ALPS European Research Infrastructure.