

INTEGRATED CENTER FOR ADVANCED LASER TECHNOLOGIES - CETAL

National Plan for Research, Development and Innovation

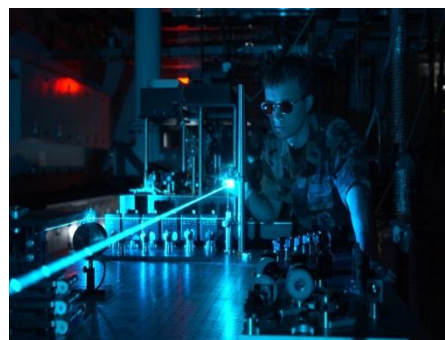
2007 – 2013 (PN II)

Programme: **Capacities**

Contract holder: **National Institute of Research & Development
for Laser, Plasma and Radiation Physics**

Contract duration: **2010-2014**

Project value: **76.931.251 lei (~ 17.095.850 €)**



General objective: **The first Hi-Tech center for frontier research in the field of photonics in Romania and all of Central and South-Eastern Europe will be created.**

Specific objectives:

- **the center will address a wide range of fundamental and applied research (physics, materials science, biology, medicine, etc.).**
- **a scientific community for world-class research in the field of 1 PW laser beam interactions with matter at intensities above 10^{21}W/cm^2 will be created in Romania; research of photonic processing and material synthesis, macro, micro si nanotehnologies will be promoted;**
- **research, measurements, and testing in the domain of photonics; the evaluation and application of electromagnetic radiation (coherent or non-coherent) over the entire spectral range from 150 nm (UV) to 1 mm (THz).**

Research directions:

- **physics of the extreme states of the matter in hyperintense laser fields;**
- **accelerated particle generation (electrons and protons in oncology);**
- **attosecond pulses, nonlinear optics, harmonics generation;**
- **coherent electromagnetic beam generation from THz to X rays;**
- **shock wave experiments for special applications;**
- **1D, 2D or 3D robotic processing of metallic, non-metallic or composite materials, down to nanometric dimensions;**
- **synthesis of micro- and nano-structures, metamaterials, photonic crystals for telecommunications and information technology;**
- **synthesis of nanomaterials by laser photochemistry (nanoparticles, nanofibers, nanotubes, nanocomposites, etc.);**
- **optical spectroscopy – UV, VIS, IR, fluorescence, THz spectroscopy, laser-induced breakdown spectroscopy;**
- **research at the atomic and molecular level;**
- **laser metrology (RENAR accreditation), optical communications, frequency reference based on the frequency comb laser;**
- **laser beam diagnosis, ISO certification of optical components under hyperintense laser beams (RENAR accreditation)**
- **imaging and chemical identifications in THz, “molecular fingerprint”;**
- **applications in the biomedical field, defence and security.**

Beneficiaries:

- **Scientists from research institutes, universities;**
- **Students and PhD students**
- **The creation of this center of excellence will create prerequisites for inter-European collaboration for ELI-NP-Ro;**
- **Economic agents (direct productive sector);**
- **The community as a whole, through the medical applications to be developed.**

Socio-economic impact:

- **Increase of Romanian scientific and technological competitiveness at an international level;**

- **Formation of the scientific community for the operation of unique equipment, especially in dealing with frontier experiments;**
- **Facilitation of the participation of the scientific community (national institutes, universities and companies in Romania) to the ELI-NP -RO project through the expertise which will be developed using the CETAL infrastructure;**
- **Efficient exploitation of the future pan-European ELI-NP-RO facility by Romanian specialists;**
- **Formation of joint scientific research teams at a European level;**
- **University curricula will be adapted to the preparing for research activities of master, doctoral and post-doctoral students;**
- **Fostering of European partnerships in EULASNET, E-L-I, LASERLAB-EUROPE, European Technology Platform "PHOTONICS 21", Horizon 2020;**
- **Fostering new partnerships with SMEs and strategic economic agents in Romania and Europe;**
- **Increase of the added value, productivity and quality of products made in Romania and the EU;**
- **Development of new products, single products and small series for applications where investment at third parties is not justified;**
- **Creating new jobs in a highly technical field.**