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Laser Science at Vilnius University: Past, Present and Future

The invention of the laser in 1960 has set important scientific and technological landmarks in many areas of modern science. Remarkable progress in laser technology was facilitated by the invention of the chirped pulse amplification (CPA) technique by D. Strickland and G. Mourou, which was awarded the Nobel Prize in Physics in 2018. This ground-breaking invention made ultrashort, high peak-power optical pulses routinely available, opening new areas of fundamental and applied research in chemistry, biology, medicine, material science and physics.

The development of laser science in Lithuania is considered a success story thanks to the unique synergy between fundamental research and the Lithuanian laser industry, which has become a source of national pride in the area of high technology. Laser science at Vilnius University has deep historical roots and has made a number of important contributions to the field, which have been recognized internationally. In particular, Vilnius University is the birthplace of ultrafast optical parametric amplifiers, the so-called multi-color lasers, which have become indispensable tools in many areas of modern science. Vilnius University owns the invention of the optical parametric chirped pulse amplification (OPCPA) technique in 1992, which was recognized as an important off-spring of the CPA technique, as outlined in the scientific background on the Nobel Prize in Physics 2018. These scientific breakthroughs provided a background to the inception of new directions of fundamental and applied research at the Laser Research Center: ultrafast nonlinear optics and spectroscopy, laser material processing and laser nanophotonics, which allowed establishing long-standing collaborations with leading research groups worldwide. These collaborative activities yielded greater international

visibility to the Laser Research Center, which became a member of the Integrated Initiative of European Laser Research Infrastructures (Laserlab–Europe) in 2004. In the near future, Lithuania will become a member of the Extreme Light Infrastructure (ELI), a European project for the investigation of light-matter interactions at highest intensities and shortest time scales.

In this presentation, I will overview the progress of laser science at Vilnius University with a particular emphasis on the period after the restitution of independence in 1990. Finally, I will discuss the current state of the art and the challenges of laser science at the Vilnius University's Laser Research Center with a look towards the future.