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INTERNATIONAL COOPERATION FOR LASER SPACE APPLICATIONS: TECHNICAL AND
POLICY CHALLENGES AND OPPORTUNITIES

Abstract

The fast-paced development of breakthrough space technology is complemented by the rise of new and powerful state and non-state actors in the space industry. Meanwhile, the contemporary international space governance framework is challenged to reflect these dynamics and adapt. The use of lasers for space exploration is one of these areas, whose enormous potential is limited by the lack of international cooperation as well as its militarization. Yet, the prospects of laser technology for space exploration are immense and include photon propulsion for interstellar travel, asteroid deflection for planetary defense, remote laser analysis of chemical and physical properties of celestial bodies or critical space debris removal in the starting era of mega-constellations.

Reacting to these dynamics, a group of state and non-state institutions organized (Breakthrough Initiatives, Charles University, Czech Ministry of Transport, Czech Academy of Sciences, Institute of International Relations) the 2019 Laser SpaceApps Workshop in Prague, Czech Republic, on September 25-27 2019, which brought in together an international cohort of top laser and optics scientists from Russia, United States, Europe or Australia to discuss main challenges for the development of laser applications for space exploration. The technical part of the workshop was complemented by policy discussions of politicians, government officials and social and natural scientists on main policy challenges in establishing an international body for the development and use of lasers in space.

This paper describes the main technical and policy challenges, which surfaced during the three-day expert event. The technical issues concerned many areas from finance, materials, power to propagation with spin-off identification or economies of scale as some of the identified opportunities. Meanwhile, policy challenges ranged from practical, security and legitimacy aspects of international scientific cooperation. The opportunities included best practices extrapolated various relevant institutions such as ITER, CERN, ITU or Laser Clearinghouse and international fora from the UN COPUOS or new formats of international space governance to enable the potential of global scientific collaboration and management. This includes information, data and knowledge sharing among a wide range of state and non-state actors, financing models and legitimacy-enhancing tools. Overall, based on the outcomes of the workshop the paper organizes and analyzes both challenges and opportunities for international scientific cooperation on laser applications for space exploration.