



Developing Practical Cooperation through Science

Belarus has been actively engaged within the framework of the NATO Science for Peace and Security (SPS) Programme since 1992.

The NATO SPS Programme enables close collaboration on issues of common interest to enhance the security of NATO and partner nations by facilitating international efforts to meet emerging security challenges, supporting NATO-led operations and missions, and advancing early warning and forecasting for the prevention of disasters and crises.

Current SPS Key Priorities include:

- *Counter-Terrorism;*
- *Energy Security;*
- *Cyber Defence;*
- *Defence against CBRN Agents;*
- *Environmental Security;*
- *Security-related Advanced Technology;*
- *Border and Port Security;*
- *Human and Social Aspects of Security.*

Additionally, the SPS Programme helps to promote *regional security* through scientific cooperation among partners. The Programme also helps to *prepare* interested eligible nations for NATO membership. SPS activities often have a high *public diplomacy* value.

BELARUS

Belarus has completed several activities with the SPS Programme. The leading areas for cooperation include **Security-related Advanced Technology, Defence against CBRN Agents, and Environmental Security.** There is currently one ongoing activity involving Belarus. Below are some examples of ongoing and completed activities led by Belarus through the framework of the NATO SPS Programme.

Cooperative Activities

ACOUSTIC MULTI-FUNCTIONAL COMPOSITES FOR ENVIRONMENTAL RISKS AND HEALTH HAZARDS REDUCTION

This Multi-Year Project (MYP) aims to advance state-of-the-art material science and nanotechnology for the production of sound-insulating and sound-absorbing materials to reduce the energy of acoustic radiation. This project will significantly reduce the noise levels in specific frequencies and temperature ranges, allowing for the assessment of new properties in acoustic composites and their absorption of electromagnetic radiation on a microwave range. Through this MYP, new scientific data on the effect of nanoscale particles on the loss of sound energy will be obtained. The results will be implemented in the frame of industrial technology. *This activity is led by Belarus and Bulgaria.* [ref. G5790].

LIGHT-MATTER INTERACTIONS TOWARDS THE NANOSCALE

This Advanced Study Institute (ASI) introduced participants to the fields of research that utilize light-matter interactions on the nanoscale, and provided a comprehensive overview of experiments and theory, basic physics and applications, as well as nanofabrication and optical characterization. Speakers introduced participants to the fundamentals of their field before presenting the latest research and practical applications. Participants had the opportunity to interact with lecturers, both formally and informally, over a two-week period. *This activity was led by Belarus and the United States. It took place in Sicily from July-August 2019.* [ref. G5540].

FUNDAMENTAL AND APPLIED NANO-ELECTROMAGNETICS II: TERAHERTZ CIRCUITS, MATERIAL, DEVICES

Nano-electromagnetics is a brand new field of study in the area of nanotechnology, and as such, its potential for defence and security applications has yet to be fully explored. This Advanced Research Workshop (ARW) focused on terahertz applications for nano-electromagnetics, and brought together a network of high-level scientists. The ultimate goal of this workshop was to create links between experts in this new discipline, and to establish the potential for nano-electromagnetics in the defence and security fields. *This activity was led by scientists and experts from Belarus and Italy. It took place in Minsk in June 2018.* [ref. G5409]

QUANTUM NANO-PHOTONICS

The goal of this ASI was to provide young scientists from NATO and partner nations with a clear exposition of the principles of nano-photonics, and the application of nanotechnology to mold the flow of light and control the interactions between light and matter. This helped enable participants to pursue research activities in this field, and to facilitate efforts to move from basic theory to applications, particularly those that are relevant to the defence and security fields. During the ASI, a number of topics related to basic principles and applications were presented. *This activity was led by Belarus and the United States. It took place in Sicily from July-August 2017.* [ref. G5187].

RADIOACTIVE CONTAMINATION IN THE POLESSIE STATE RADIATION-ECOLOGICAL RESERVE

This Multi-Year Project (MYP), which assessed the hazards of radioactive contamination, included the analysis of archival material on contamination levels and field measurements. The primary objective was to develop uniform methods for the sampling and

measurement of a number of isotopes in soil and water, and the level of contamination within the Chernobyl exclusion zone and the Khoyniki District of the Reserve. The project teams used data from recent soil samples to study the migration and transport of the contamination through the atmosphere and water. The Ministry of Emergency Situations and Ministry of Environmental Safety and Natural Resources of Belarus have been the main end-users of the results. *This activity was led by Belarus, Ukraine, and Norway.* [ref. 983057].



NANO-OPTICS: PRINCIPLES ENABLING BASIC RESEARCH AND APPLICATIONS

Nano-optics have the potential to improve upon state-of-the-art defence and security applications ranging from radar to chemical radiation. They are the key technologies of the 21st century, and will form an important part of many future security-related technologies, including detection systems. During this ASI, held in July 2015, young scientists from NATO and partner nations were trained in the principles and applications of nano-optics and nano-technologies. The goal was to foster an interest in young scientists to subsequently pursue research in this area, and to help translate the promising theory into practical application.

In July 2013, an ASI entitled 'Nano-Structures for Optics and Photonics: Optical Strategies for Enhancing Sensing, Imaging, Communications and Energy Conversion' also took place in Italy. The purpose of this course was to introduce students to the field of nano-structures by providing them with a comprehensive overview of experiments and theory. *Both activities were organised by Belarus and the United States.* [ref. 984482 and 984883].



The NATO Science for Peace
and Security Programme