



Il Colle di
Galileo

Workshop on “Advanced laser sensing of gases” – Galileo’s Briefings

INO Headquarters, Largo Enrico Fermi 6 – Arcetri Florence

Organizers: National Institute of Optics INO – CNR

Abstract. A workshop on “Advanced laser sensing of gases” at the CNR-INO headquarters on the Arcetri hill started the new series of seminars called “Galileo’s briefings: Looking beyond”. Three experts in the field were invited to discuss about laser sensing techniques and some of their most exciting applications with researchers from INO and other institutes.

Keywords. Optics, laser sensing, environment, health, security, spectroscopy, metrology, systems and sensors.

A one-day workshop was organized at the CNR-INO headquarters in Arcetri, Florence, on October 27, 2017, in the recently renovated Seminar Hall. This workshop forms part of a new series of seminars on the Arcetri hill, named “Galileo’s briefings: Looking beyond”. The idea is to propose day seminars and meetings on specific themes selected among the hot topics in optics, with the aim of bringing together researchers from different institutes, promoting cultural exchange and driving new ideas and collaborations. The theme chosen for this opening event was “Advanced laser sensing of gases”, one of the leading sectors of the Institute.

Three experts in the field were invited to present their activity and to discuss on the latest developments and the most promising prospects for laser gas sensing. The development of techniques for breath analysis is at the core of the research activity of Prof. Simona Cristescu, from the Institute for Molecules and Materials, Radboud Universiteit Nijmegen, and was the leitmotif of her seminar “Breath-taking research with laser-based spectroscopy”. This field has gained more and more interest during the last years because it enables non-invasive monitoring of biochemical processes in the human body, allowing real-time monitoring of different metabolic processes.

Prof. Livio Gianfrani, University of Campania, spoke about “Gas metrology by means of precision laser spectroscopy”. He reported on laser absorption spectroscopy for environmental and chemical metrology, with applications like measuring the density of atmospheric relevant molecules, accurate analysis of the isotopic

composition of gaseous samples and high-quality determination of spectroscopic parameters for the main constituents of Earth and planetary atmospheres.

The interest in optical sensing techniques for environmental sensing is also shared by Prof. Erik Kerstel, University of Grenoble Alps, who held a seminar on “Cavity enhanced spectroscopy in the environmental sciences”. Particular attention was paid to field applications like the analysis of air samples trapped in the oldest Antarctic ice (“Subglacior” project), aimed to study the mechanisms, non-linear variations and retroactive effects of climate shifts.

The guest speaker lectures were alternated with three short talks by young INO-CNR researchers from Sesto Fiorentino and Naples. Dr. Gianluca Di Natale opened the workshop with a talk titled “In-situ and remote sensing of atmospheric properties”. Dr. Giulio Campo focused on the development of narrow-linewidth infrared sources and combs for high-sensitivity gas sensing techniques in his talk “High-coherence mid infrared sources for gas sensing”. Finally, Dr. Antonio Giorgini discussed interesting applications of laser sensing to liquids in his talk “Optical resonators for liquid spectroscopy and bio-chemical sensing”.

The workshop was well attended, with researchers from various institutes including INO, IFAC and LENS. In addition, a significant number of people followed the proceedings via web streaming. The success of the event is a confirmation of the role played by laser sensing in both scientific research and our lives, and a good test for the forthcoming “Galileo’s Briefings” events.



Figure 1. Photos of the seminar sessions during the workshop.