Séminaires @ ICARE

Towards gas and plasma flow velocity measurements with coherent Rayleigh-Brillouin scattering

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Coherent Rayleigh-Brillouin scattering (CRBS) is a four wave mixing diagnostic technique that relies on the creation of an optical lattice in a medium due to the interaction between polarizable particles and intense laser fields. Single shot CRBS has already been demonstrated to be the coherent analog of spontaneous Rayleigh-Brillouin scattering in measuring the temperature, pressure, bulk and shear viscosity, speed of sound and polarizability of a gas or gas mixture. Additionally, in situ measurements of ~5 nm nanoparticles produced in an arc discharge have been facilitated with CRBS.

In this talk, an overview on the theory and experimental aspects of single shot CRBS will be presented. Furthermore, I will discuss the feasibility and working progress towards the use of single shot coherent Rayleigh-Brillouin scattering (CRBS) as a gas flow and temperature measuring technique, with anticipated measurable velocities down to 10-20 ms^{-1}, applicable to atomic and molecular gases, gas mixtures, as well as partially ionized gases.

Alexandros Gerakis is an Assistant Professor at the Aerospace Engineering Department, Texas A&M University, leading the “Optical Probing and Manipulation” Group. He obtained his BSc from the School of Applied Mathematical and Physical Sciences, National Technical University of Athens, Greece. He then moved to Scotland, UK, to obtain his Master’s degree from St Andrews and Herriot-Watt Universities, in "Photonic and Optoelectronic Devices". His PhD was obtained from University College London, under the supervision of Professor Peter Barker. The research he conducted there was regarding coherent Rayleigh-Brillouin scattering, but also the utilization of chirped optical lattices for the creation of ultracold H2 molecular ensembles using the optical Stark deceleration method. He stayed at the same group as a postdoc, before crossing the Atlantic for a postdoc at Harvard University under the supervision of Professor Ni, in work relating to creating single ultracold NaCs molecules for use in ultracold chemistry studies. Before moving to Texas A&M University, he was an Associate Research Physicist at the Princeton Plasma Physics Laboratory where he was responsible for the development of the coherent Rayleigh Brillouin scattering diagnostic at the Laboratory for Plasma Nanosynthesis.

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