A versatile optical sensor for the characterization of fluids

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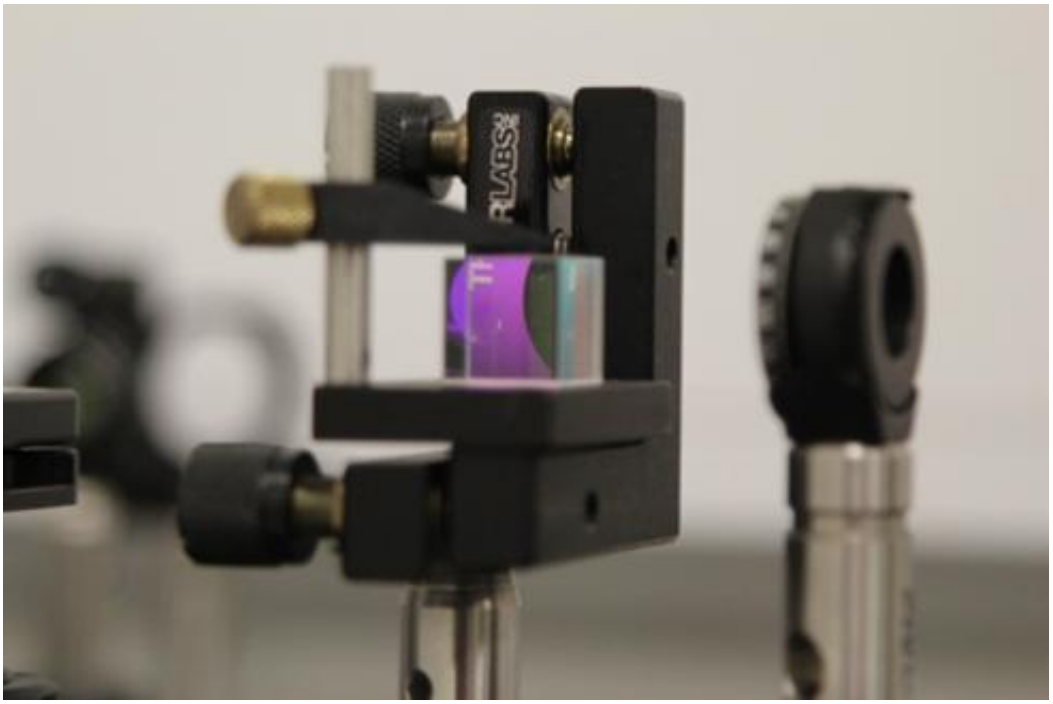

Laser self-mixing is a technique usually used for the measurement of low velocities and vibrations. In a paper that has just been published in the journal Nuclear Instruments and Methods A, researchers from the Cockcroft Institute/University of Liverpool present how these measurements can be extended to velocities of fluids using additional seeding particles. Parameters of fluids such as velocity and the

concentration of seeding particles were under study to understand the effect on the performance of the sensor for possible future use on gas jets.

Alexandra Alexandrova from the QUASAR Group, who carried out the study as part of her Fellowship within the LA^{3}NET project said: "We use this setup as a basis to analyze the potential for future gas-jet characterization applications – which would be an entirely new application for this technique. Non-invasive characterization of such jets is critically important for applications such as beam instrumentation, laser-plasma acceleration, spectroscopy of radioactive isotopes, and many others."

In the paper a detailed investigation into fluid targets is presented that covers velocity measurements of up to 1.5 m/s. Further experiments were performed to observe the influence on the spectrum of the self-mixing sensor to the concentration of seeding particles in the range of 0.8% to 0.03% and velocities themselves. Previous work related to self-mixing was focused on the precision and spatial resolution of the method rather than the possibility of measuring high velocities of the fluids and the presented results are entirely new.

More information: A. Alexandrova et al. Laser diode self-mixing technique for liquid velocimetry, *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* (2016). DOI: 10.1016/j.nima.2015.12.042

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