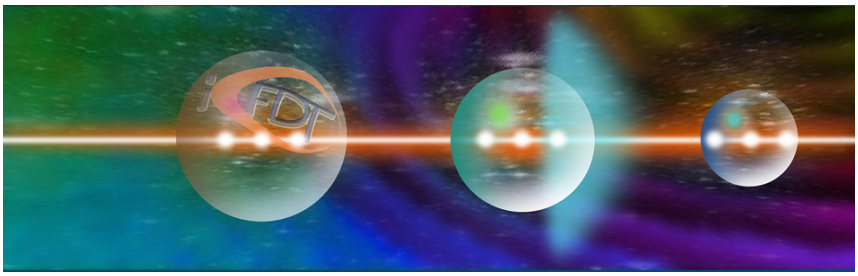

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An UV-LIF system to detect, identify and measure the concentration of biological agents in HVAC

Thursday, October 4, 2018 2:30 PM (1h 30m)

Bacteria, viruses and fungi may proliferate in heating, ventilating, and air-conditioning (HVAC) systems, representing a serious concern in healthcare settings, due to the occurrence of nosocomial infections in vulnerable patients. Detection and classification of biological agents are not easy, especially at an early stage of contamination and when more than one species are aerodispersed. Our research aims at demonstrating the capability of UltraViolet Laser-Induced Fluorescence (UV-LIF) technique in monitoring the level of biological contamination in the HVAC system of healthcare settings exploiting ubiquitous endogenous fluorophores. The incident radiation is a second harmonic Nd:YAG laser emitting at 355 nm. A spectrometer collects the fluorescence spectra that are subsequently analysed in order to achieve information about the classification and the concentration of each agent in the sample.

The benefits of the UV-LIF combined with data analysis techniques concern the speed of the analysis, the limited costs for the equipment, and the possibility to analyse the airflow without the need for sampling. The application of this method to the monitoring of HVAC systems in healthcare settings could allow a fast and targeted response in the event of a contamination, decreasing the risks related to nosocomial infections and reducing the costs for the maintenance of the system.

In this work, the experimental setup and the capability of the classification and measurement techniques will be discussed. First measurements are used to test the possibility to classify the different biological agents of a mixture sample by Principal Component Analysis and Least Square Minimisation Method, both based on the application of classification algorithms to the spectra measured.

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