



UNIVERSITÀ  
DEGLI STUDI  
DI BERGAMO

Dipartimento  
di Ingegneria  
e Scienze Applicate

# Laser Diagnostics in Sprays

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**Seminars organised within the framework of the DR**IPIT** Project**

**4<sup>th</sup> June 2019, 9:00-13:00, room B103; 5<sup>th</sup> June 2019, 9:00-13:00, room B102**

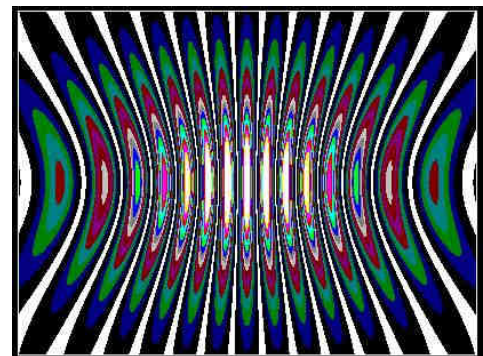
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## Abstract

The lectures will provide an overview of the main laser-based measurement techniques developed in the last decades, with the purpose of considering needs, milestones, challenges, and a broad array of techniques from one component LDV to Tomographic PIV. Laser Doppler Velocimetry (LDV), Phase Doppler Velocimetry (PDV) and Particle Image Velocimetry (PIV) techniques will be described with some details, with special emphasis on the physical foundations and on the main application issues, since they are the experimental tools currently applied to validate numerical simulations of the flow structure in complex environments, such as sprays and two-phase flows.

Classical imaging techniques of liquid sprays and vapor phase, such as Mie-scattering, Shadowgraph, and Schlieren will be also addressed, together with novel approaches to reduce the multiple light scattering in optical dense sprays and improve visualization of the atomization process (e.g. SLIPI).

Several significant examples of experimental studies and scientific achievements will be reported to elucidate peculiarities, advantages or drawbacks of the most relevant instruments and methodologies used in spray research.



*Simulated interference fringes pattern from crossing laser beams.*

## Time Schedule of the seminars

### 1<sup>st</sup> day

1. Introduction to imaging techniques of sprays: Mie-scattering, Shadowgraph, Schlieren and SLIPI. Classification of optical methods and basic optical concepts. (1 hour)
2. Quantitative visualization: Particle Tracking and Particle Image Velocimetry. Basic principles and historical development. Peculiar applications in two-phase flows. (2 hours)
3. Recent developments of tomographic PIV and examples of applications. (1 hour)

### 2<sup>nd</sup> day

4. Laser Doppler and Phase Doppler Velocimetry: basic principles and historical development. Measurement accuracy and limitations in spray applications. (3 hours)
5. Examples of applications of LDV and PDV to sprays and two-phase flows. (1 hour).

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