

# **The development and application of structured laser illumination planar imaging**

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## **ABSTRACT**

Imaging through optically turbid media such as atomizing spray systems is challenging due to multiple light scattering inside the object. Such multiply scattered light deteriorates the desired signal, often by generating a diffuse background. To address this, we at the Division of Combustion Physics at Lund University have developed a laser-based imaging technique called Structured Laser Illumination Planar Imaging (SLIPI) that is capable of separating the sought signal component (either unperturbed or singly scattered light) from the contribution arising due to multiple light scattering. To enable this separation, SLIPI adds an intensity modulation to the incident light. When photons are multiply scattered inside the object, they lose this modulation structure whereas the unperturbed or singly scattered light maintains it. By shifting this modulated structure in space, the undesired light component can then be removed digitally. In this presentation, I will explain the principles behind the SLIPI technique and describe different optical configurations that we have developed over the years. I will also briefly mention how modulated imaging can be used for other purposes besides imaging through turbid media, such as ultrafast femtosecond videography and instantaneous multispectral imaging.