Comprehensive analysis of hierarchical dynamics in ablation by scattering, imaging and spectroscopy

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Particle synthesis during pulsed-laser ablation in liquid is a multiscale process [1] involving the occurrence of atoms, cluster and nanoparticles, their subsequent interaction and agglomeration, and finally their dynamic confinement within the fluid [2] and vapour formation all of which happening on a hierarchy of time and length scales [3]. The connection between the nanoscale particle formation processes and the macroscopic fluid dynamics is resolved by employing spatially and temporally resolving small-angle X-ray scattering, bright and dark-field X-ray imaging [3,4] methods as well as spectroscopic tools [5].

The presentation will discuss the approaches and limitations of time-resolved techniques to harness scattering, imaging and spectroscopy signals for the understanding of complex dynamics including speciation and spatiotemporal distributions of nanostructures. The ESRF upgrade may help to overcome current flux and size limitations in breaking the microsecond barrier [4,6].

References

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