Dottorato di Ricerca in Fisica – PhD in Physics
(XLII Ciclo)

Research Project:

Intrinsic Dynamics of Emulsions: From Droplet Interactions to Stability in Microgravity

Abstract:

Emulsions are colloidal dispersions of two or more immiscible liquids. They are central in a great number of processes and products where effective methodologies are required, either for their stabilization or destabilization. Despite their pervasiveness, much of our knowledge about emulsions is empirical, while the basic principles need to be deepened. This could lead to more rational formulations and processes, using less energy or less polluting chemicals. Microgravity allows to address the intrinsic drop dynamics, which features dynamic transitions associated to drop aggregation and coalescence, which in turn determine emulsion stability.

This PhD Project focuses on experiments on the International Space Station, using the facility Soft Matter Dynamics (SMD) [1] to investigate emulsions in microgravity by Diffusing Wave Spectroscopy (DWS) [2-5], within an international team (SEEDS collaboration), possibly by exploiting opportunities offered by the ESA call "free flying platforms". L.C. is P.I. of the SEEDS collaboration. He coordinates a proposal recently submitted to ESA for microgravity experiments on free-flyers and is the coordinator of a project on Physical Sciences experiments that has successfully passed Phase 1 and has been admitted to Phase 2 evaluation of the Italian Space Agency (ASI) call.

References

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Prof. Luigi CRISTOFOLINI luigi.cristofolini@unipr.it