

Internship proposal 2010-2011

Laboratory : Photonics Laboratory	
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Resummation of asymptotic divergent series in optics.

Scientific project :

Divergent series have customarily been considered computational tools of invaluable usefulness in several physical branches, and several techniques, aimed at decoding them, have been developed since Euler's time. In particular, asymptotics finds a natural field of applications at the borderland between physical and geometrical optics, where the smallness of the corresponding wavelength radiation unavoidably involves the handling of factorial divergent series in problems like light scattering or beam propagation. The current growing interest toward vectorial treatments of such classes of problems unavoidably makes the mathematical/numerical aspects of the relevant modeling processes an increasingly crucial step.

Aim of the project is to devise new resummation techniques for the decoding of the asymptotic series generated, via the standard steepest descent method, from the diffraction integrals describing the nonparaxial free-space propagation of a wide class of vectorial optical fields.

In particular, the joint action of the so-called hyperasymptotics and of suitable sequence transformations will be investigated as far as its theoretical and applicative features are concerned.

Techniques in use :

Diffraction theory, sequence transformations, asymptotic/hyperasymptotic expansions

Applicant skills :

Disposition to theoretical work in optics and numerical analysis

Granted internship : no

C'nano IdF laboratory (France only) : yes / no

Possibility for a thesis : yes, financial support possible after selection according to national rules.

Amount of the grant: approximately 13640 €/year (previdential contribution shall be deducted).