

Code B_2428

Department	Mathematics and Computer Sciences
UniCa reference person	Francesco Demontis
Project title in English	Study of the scattering data for the Schroedinger equation on the line with generic potentials
Project title in Italian	Studio dei dati di scattering per l'equazione di Schroedinger sulla linea con potenziali di tipo generico
Subject area of reference (World University Ranking)	PHYSICAL SCIENCES (inc. Mathematics, Chemistry, Geology, Earth & Marine Sciences)
Project summary and VPS' profile	<p>The Korteweg-de Vries equation (KdV) appears in the description of water waves on the surface of a long canal. Since 1965 it is known that the Cauchy problem of the KdV equation can be solved by the inverse scattering transform (IST), where the KdV equation is converted into the evolution of scattering data of the Schroedinger equation on the line. As to these scattering data, we distinguish the generic case pertaining to most potentials and the exceptional case pertaining to potentials generating soliton solutions. As part of an ongoing program to develop a numerical method for implementing the various stages of the IST, separate algorithms are required for just one step of the IST, leading to numerical instability in the near-exceptional generic case. It would therefore be most expedient to develop an asymptotic theory of near-exceptional scattering data, which requires expertise in the scattering theory of the Schroedinger equation. In this context, the main purpose of this project is to:</p> <ul style="list-style-type: none">A) find asymptotic expressions of the reflection and transmission coefficients and the Jost solutions when an exceptional Schroedinger potential is perturbed to yield generic potentials.B) study the stability of the generic scattering data under the perturbation.C) develop the perturbation theory for Faddeev class Schroedinger potentials, preferably without resorting to increasing integrability and/or smoothness assumptions on these potentials. <p>The visiting professor is expected to perform the following tasks:</p> <ul style="list-style-type: none">1) to contribute significantly to developing analytic and numerical methods for solving the KdV and related nonlinear evolution equations by using the Inverse Scattering Transform and the triplets method.2) to teach a (mini) PhD Course on the direct and inverse scattering theory of the Schroedinger equation on the line.3) to interact with the Applied Mathematics Group (professors, PhD students, postdocs)
Proposed length of stay	Short visit of 10 days
Expected period of activity	March 2024
Academic or professional position of the VPS'	Professor

Course of Study	Dottorato di ricerca (PhD Course)
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Language of instruction	English
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