INTERNSHIP PROPOSAL

(One page maximum)

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Thesis possibility after internship: ~~YES~~/NO
Funding: YES/~~NO~~ If YES, which type of funding:

Exploring Combined Mathematical Techniques for Precise Computation of Resonance Properties

The computation of resonance properties relies on various mathematical techniques, with a particular focus on the width of a state, representing the inverse of its half-life time $\hbar$. This width significantly influences the scattering amplitude in the proximity of the resonance energy and demands precise prediction. One method, complex scaling (CS), involves rotating momenta towards the complex plane, unveiling poles of the S-matrix. Similar momentum distortions to the complex plane are utilized by several others methods.

However, the use of a complex potential as a meta-model for absorption from the numerous other open channels induces a counteractive rotation of the S-matrix poles. This phenomenon raises the need to explore a combined approach integrating both techniques. The objectives of this internship encompass:

I. Investigating the synergy between complex scaling and complex potential to minimize the required CS rotation for discovering pole locations.

II. Analyzing the trajectory of the poles related to the imaginary component of the potential to understand their behavior.

III. Exploring the mathematical properties of the Jost function in the presence of a complex potential.

The internship aims to refine the computation of resonance properties and deepen our understanding of their mathematical underpinnings.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: ~~YES~~/NO Soft Matter and Biological Physics: ~~YES~~/NO
Quantum Physics: ~~YES~~/NO Theoretical Physics: YES/NO