INTERNSHIP PROPOSAL

(One page maximum)

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

Application of Eigenvalue Continuation method to the continuum.

The Eigenvector Continuation (EC) method has emerged as a pivotal technique in nuclear structure analysis, standing as a standard tool for evaluating convergence properties within many-body methods. This method involves parameterizing the Hamiltonian to control its perturbative nature. In conjunction with considerations such as mesh size and other factors, numerical methods yield a finite set of results based on the parametrized input. These results encompass energies and eigenvectors expanded as Taylor series or Padé approximations, with coefficients tailored within a parameter range where the technique attains near-exactness.
A significant parallel exists between the EC workflow and methodologies in machine learning. Similar to the development of an AI algorithm, the EC approach necessitates using a training set to parameterize the algorithm before making predictions in uncharted regions beyond the training data. Despite encountering efficiency challenges in computing states across continua due to high-dimensionality, certain standard scattering techniques enable operations within a finite internal region.
These methodologies facilitate the application of EC to predict converged reaction observables. The primary aim of this project is to investigate the application of EC to a specific scattering solver, with a particular emphasis on integrating it with the No-Core Shell Model possessing continuum capabilities.

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