

INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: Michigan State University; Facility for Rare Isotope Beams (FRIB);

International Research Laboratory NPA.

CNRS identification code: IRL2024

Internship director's surname: Pablo Giuliani and Kyle Godbey

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Phone number:

Web page: <https://npa.in2p3.fr/summer-training-program/>

Internship location: East Lansing, Michigan, USA

Thesis possibility after internship: NO

Funding: YES/NO, possible

If YES, which type of funding:

gratification de stage CNRS (environ 700euros/mois)

Title: Development of surrogate models for expensive calculations

Summary (half a page maximum)

The incoming student will work on using dimensionality reduction techniques to develop surrogate models for expensive numerical calculations (see <https://www.frontiersin.org/articles/10.3389/fphy.2022.1054524/full>, and <https://journals.aps.org/prc/abstract/10.1103/PhysRevC.109.044612>). The approach will follow a series of recent data-driven approaches (see <https://arxiv.org/abs/2502.03680>, <https://arxiv.org/abs/2406.04279>, and <https://youtu.be/XiRFiH-7MG8?si=rcyS-sU4eZVEgjWa&t=1321>). If the student comes with a specific model/simulation in mind the project will focus on creating an emulator for that, but other options are available ranging from reactions, nuclear structure calculations, nuclear astrophysics, and experimental control. We expect that after the end of the program the student will be able to bring to their home institution the knowledge to apply dimensionality reduction techniques to speed up computations and tailor them to their specific needs. If progress during the three month period was effective, we also expect to write a publication with the findings.

Expected incoming student skills: Intermediate coding experience in at least one language (python, Mathematica, c++, fortran). Basic knowledge of differential equations.

The registration for the internship must be done on the website: <https://npa.in2p3.fr/summer-training-program/>

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

Condensed Matter Physics: NO Soft Matter and Biological Physics: NO

Quantum Physics: YES

Theoretical Physics: YES