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'surname: Filomena Nunes and Chloë Hebborn
e-mail: nunes@frib.msu.edu and hebborn@ijclab.in2p3.fr
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: Constraining the 12C(α,γ)16O fusion by analyzing transfer data with quantified uncertainties.
Summary (half a page maximum)

Fusion processes involving α-particles are central to understanding the lifecycle of massive stars and the
formation of heavier elements. Directly measurements of these reactions are very difficult and most of
the time impossible as the Coulomb repulsion between the nuclei suppresses the reaction probability.
Instead, these reaction rates are often evaluated using nuclear properties inferred from transfer reactions
measurements in which an α- particle is transferred to the nucleus of interest. The quality of these
evaluations depends strongly on the accuracy of the reaction theory used to interpret these transfer data.
In this project, the student will use nuclear reaction models to analyse 12C(7Li,t)16O transfer reaction data.
In this process, they will quantify the uncertainties associated with the inputs of these models onto
12C(7Li,t)16O transfer cross sections, using Bayesian statistics. By comparing their predictions to
12C(7Li,t)16O data, they will infer constraints for the 12C(α,γ)16O fusion rate.

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