Internship Title

Internship - Nuclear Data for medical isotope production

Duration of Internship

3 to 12 months

Organizational Setting

Department: Nuclear Sciences and Applications (NA)

Division: Physical and Chemical Sciences (NAPC)

Section: Nuclear Data Section (NDS)

Unit: Nuclear Data Development Unit (NDDU)

Main Purpose

During the duration of the internship with the Nuclear Data Section, the intern will be responsible for and/or help with the following:

1. Assembling and categorizing experimental nuclear data (from EXFOR database) for medical isotope production with charged-particle or photon accelerators

2. Comparison of experimental data with associated nuclear data libraries, such as TENDL, ENDF-BVII and the IAEA medical isotope database

3. Optimization of nuclear model parameters of the TALYS code to add or improve nuclear data evaluations

Qualifications include excellent knowledge of

• Intermediate level nuclear physics principles of nuclear reactions and decay data

• Scientific programming languages such as Fortran and/or C++, and or scripting languages such as Python or bash

• Scientific databases

Tasks / Key Results Expected

Depending on progress, interest and priorities, a selection of the following:

* Getting acquainted with general principles of
  + Proton, deuteron and alpha-induced reactions and cross sections
  + EXFOR cross section database
  + Nuclear data libraries like TENDL-2023
  + Medical isotope production
* Validation of the EXFOR database for proton-induced reactions
  + Compare experimental data in EXFOR with evaluated data libraries
  + Produce “Quality score” tables for proton-induced reactions to facilitate high-quality data evaluations.
* Create optimal input files for TALYS code:
  + Performing TALYS calculations and adjust nuclear model input parameters to obtain the best agreement with experimental data from EXFOR
  + Compare the TALYS results with those of others (a large number of publications of people using TALYS for medical isotope production exists)
* Testing of, and possibly contributing to, a medical isotope production web engine which is planned for 2018.
  + Calculation of the isotope yield from a combination of cross sections, accelerator characteristics and formula for stopping power (software already available)
  + Testing of the web tool made by the Nuclear Data Section
* Extension of proton-induced to photon-induced reactions, since these are also considered as promising medical isotope production routes.

Knowledge, Skills and Abilities

* Familiarity with a modern programming language such as Python.
* Experience with databases with scientific data is an asset.
* Good communication and teamwork skills; capable of working independently and proactively.

Qualifications and Experience

* University degree in Computer science, Data Science, Physical Sciences, Mathematics, Engineering or a related discipline.
* Experience in a relevant programming language.

Potential Institutions/Organizations that can be reach out to in order to attract potential applicants

* Technical Universities.
* Research Institutes.

Internships

The IAEA accepts a limited number of interns each year. The internships are awarded to persons studying towards a university degree or who have recently received a degree (see Internship web pages for further details).

The purpose of the programme is:

* To provide interns with the opportunity to gain practical work experience in line with their studies or interests, and expose them to the work of the IAEA and the United National as a whole.
* To benefit the IAEA's programmes through the assistance of qualified students specialized in various professional fields.
* The duration of an internship is normally not less than three months and not more than one year.

Applicant Eligibility

* Candidates must be a minimum of 20 years of age and have completed at least three years of full-time studies at a university or equivalent institution towards the completion of a first degree.
* Candidates may apply up to one year after the completion of a bachelor's, master's or doctorate degree.
* Candidates must not have previously participated in the IAEA's internship programme.
* Excellent written and spoken English essential; fluency in any other IAEA official language (Arabic, Chinese, French, Russian) an asset.
* Candidates must attach two signed letters of recommendation to their application.