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Developments of IAEA Nuclear Data Explorer: Experimental and Evaluated Nuclear Data Libraries Visualization and Retrieval System

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The utilization of experimental nuclear reaction data in the EXFOR format and evaluated nuclear data in the ENDF-6 format necessitates preprocessing, which remains challenging for users aiming to apply contemporary computational methods in their modern data analysis and nuclear data evaluation efforts.

To address this issue, the IAEA Nuclear Data Section is tasked with developing access to EXFOR and ENDF-6 data, such as the EXFOR and ENDF web retrieval systems. With the rapid advances in computing infrastructure and the increasing demand to process nuclear data at scale for ML and AI applications, additional flexible retrieval options and open-source programs distributed under a permissive license will be beneficial to the nuclear data community. This will facilitate interdisciplinary collaboration among researchers and scientists in the fields of nuclear physics, nuclear data, and nuclear applications.

To enhance the accessibility and openness of EXFOR datasets, both the data and related codes need to adhere to the requirements established in SG50. This includes (1) open-source EXFOR parsing software to convert the existing EXFOR format into a more computationally accessible format and (2) a web service that implements the FAIR principles (Findable, Accessible, Interoperable, Reusable).

To meet these requirements, we have developed EXFOR parsing computer programs (EXFOR Parser) in Python to convert data from the EXFOR format to JSON. These JSON files are further converted into tabulated (x, y) data and pre-processed evaluated nuclear data libraries. Additionally, we have developed the visualization web system, IAEA Nuclear Reaction Data Explorer, and its APIs. In this presentation, we will explain the current data models and pipeline, as well as the necessary further developments.

Primary author: OKUMURA, Shin (IAEA)

Presenter: OKUMURA, Shin (IAEA)

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