

ML enabled X-ray detector response matrix for intra-detector migration

Abstract

The tokamak plasma emits X-rays throughout its duration at different wavelengths, each corresponding to a range of physical processes. These X-rays are recorded either in terms of power or flux, as part of X-ray spectroscopy. There are many types of X-ray detectors available, each with different capabilities. Detector selection depends on which features are most important for the experiment. Tokamak X-ray spectroscopy requires high temporal and energy resolution, compact size, operation under a magnetic field, and resistance to temperature-related noise. No single detector possesses all these features, so compromises must be made. This project aims to design a machine learning-enabled response matrix that can predict any X-ray detector's response using data from a poor-performing detector. This will require a large dataset of responses from various sources and detectors, which will be used as training data for the machine learning model. The project is entirely theoretical, with no exposure to actual X-ray sources. The student will be provided with the data directly.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: M.Sc. Computer Engineering/IT/MCA

3) Academic Project duration:

(a) Total academic project duration: 24 Weeks

(b) Student's presence at IPR for academic project work: 5 Full working Days per week

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