

Introduction

- Reactor Evaluation Through Inspection of Near-field Antineutrinos
- Antineutrino detectors have potential for use as independent, tamper-proof tools for reactor monitoring



Technical Approach

- Applied to a small, low-power-rating fast reactor design, the Advanced Fast Reactor-100
- Simulate the reactor core with one significant quantity of plutonium removed from various assemblies
- Determine the predicting power for diversion scenarios
- High Bias Machine Learning for Sensitivity Limits



Machine Learning Methods for Antineutrino-Based Safeguards

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background removal point by point removal could improve information

Technical Approach



between different indices of data





• 2D and 3D representation of 4D feature space • Want to separate anomalies (source radiation) from normal (background radiation) One-Class Support Vector Machine used for classification

Results

• What is the right answer? • Target percent anomaly: 24.85% • Achieved percent anomaly: 24.37% • Number of training errors: 30,176

Impact

• Generation of unique dataset Nuanced background removal

Future Work

 Inclusion of deadtime • Use of actual background data Planned internship (LBNL)

