

Project Objectives

BROAD OBJECTIVE:

- INTEGRATE MODERN ARTIFICIAL INTELLIGENCE/MACHINE LEARNING – BASED METHODS INTO THE NUCLEAR DATA PIPELINE

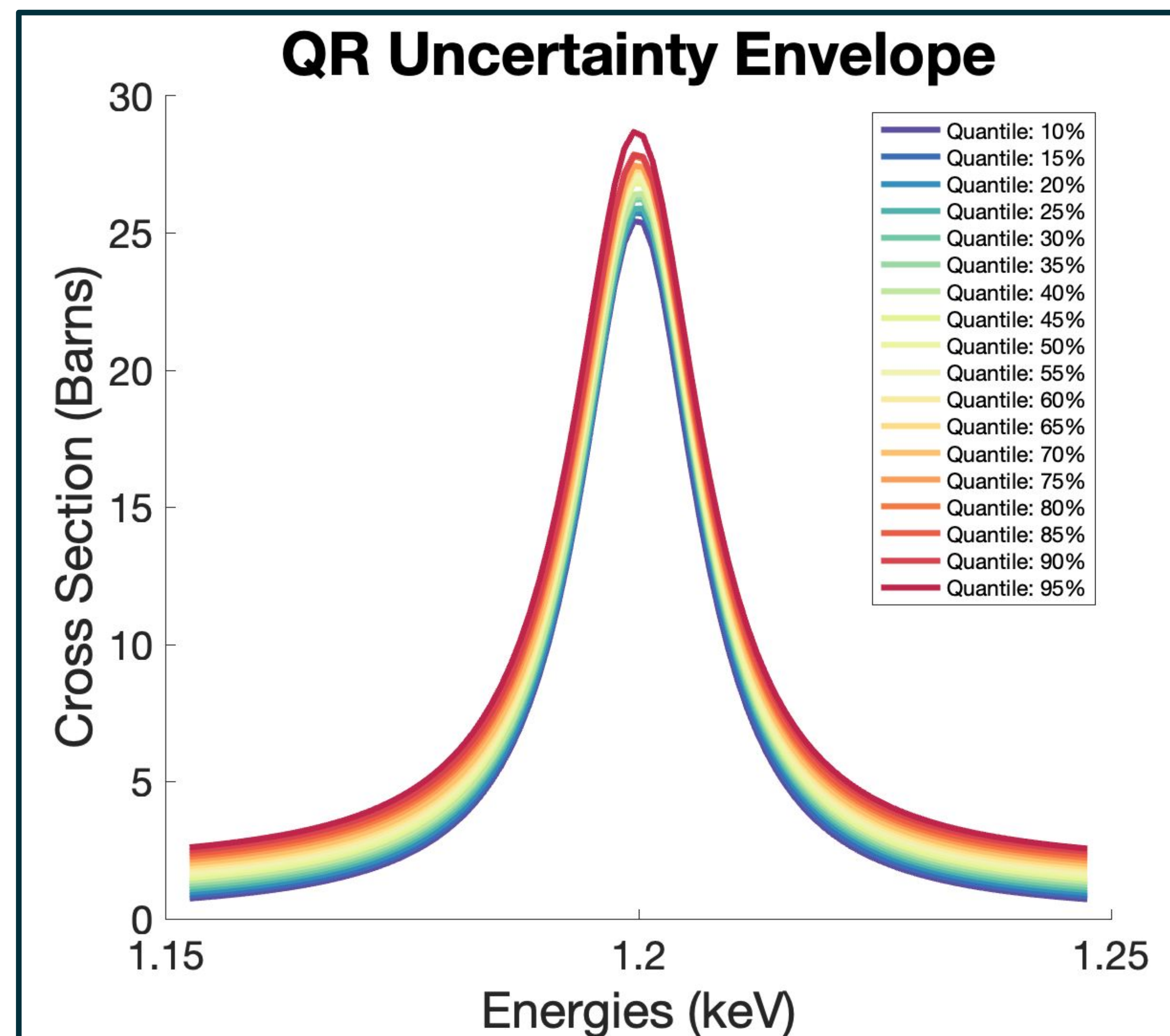
THE CURRENT WORK FOCUSES ON NEUTRON CROSS SECTION DATA IN THE RESOLVED RESONANCE RANGE

SPECIFIC OBJECTIVE:

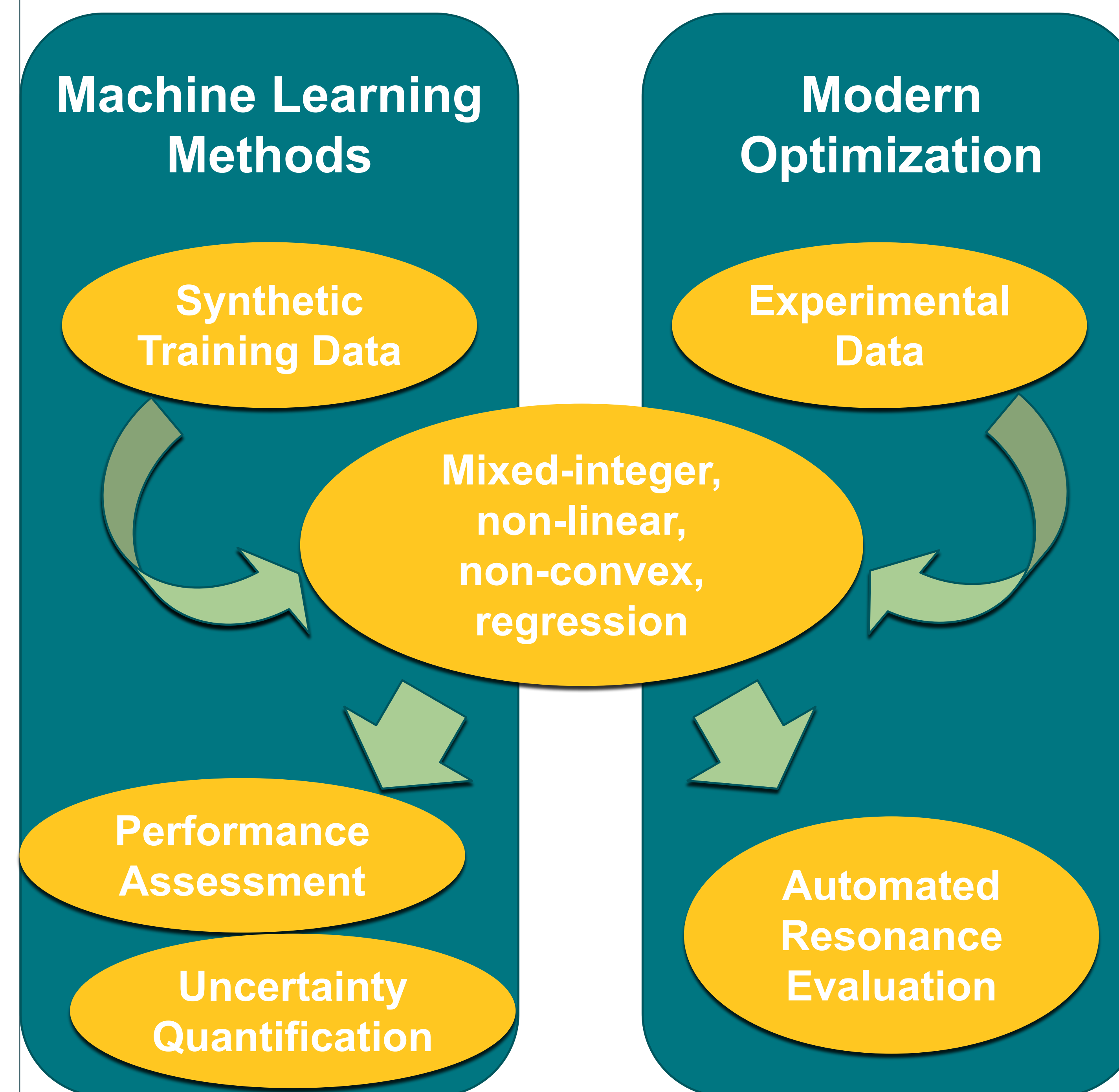
GIVEN EXPERIMENTAL CROSS SECTION DATA, CAN WE CREATE A TOOL TO AUTOMATICALLY DETERMINE:

- NUMBER OF RESONANCES
- SPIN GROUP ASSIGNMENT
- RESONANCE PARAMETERS
- UNCERTAINTY

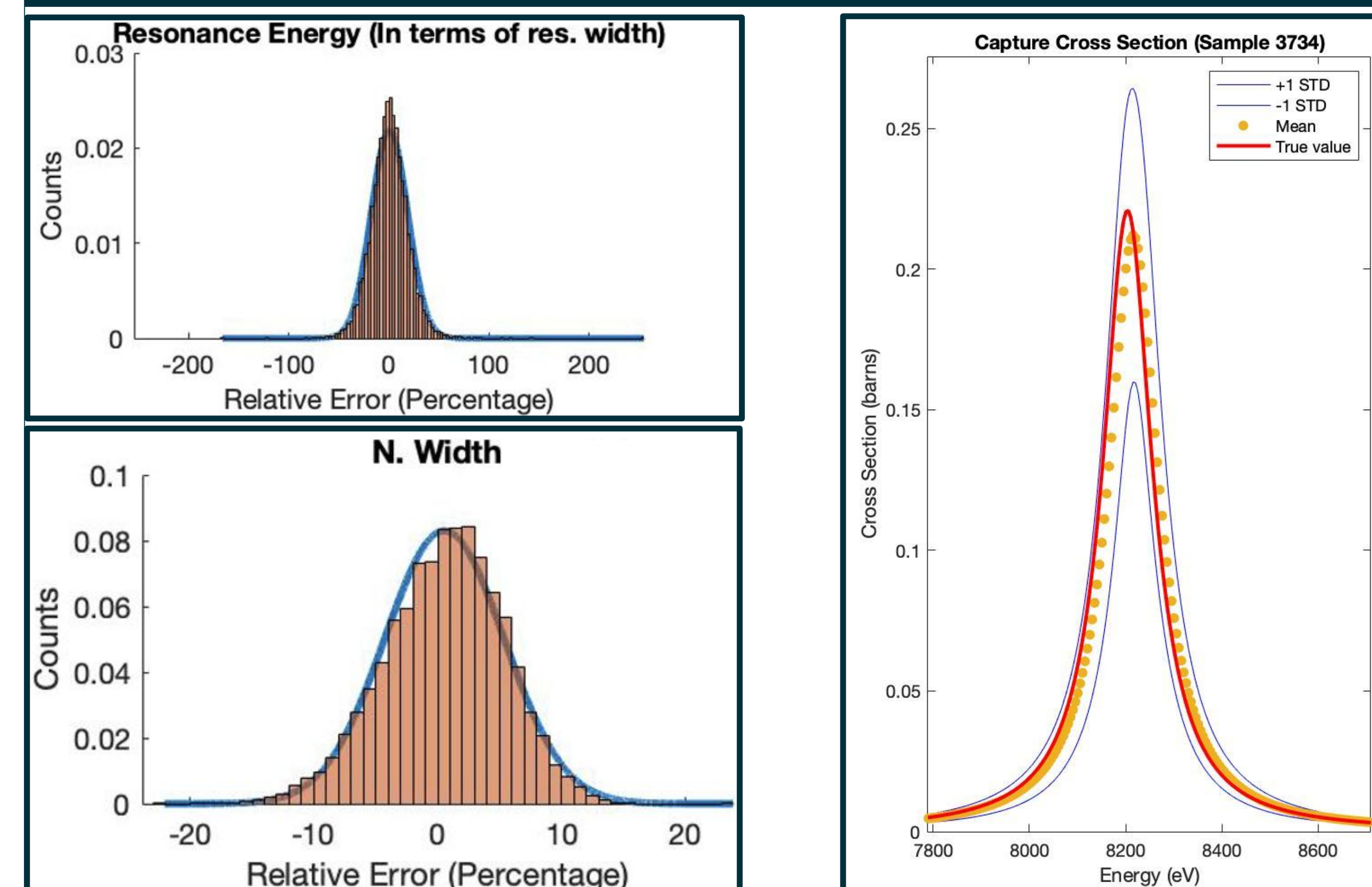
Uncertainty Quantification via Quantile Regression



Modular Workflow



Buildup of Performance Statistics



NSSC Mission Relevance

BROAD IMPACT:

- HELP THE NUCLEAR DATA COMMUNITY TO KEEP PACE WITH RAPIDLY DEVELOPING TECHNOLOGIES FOR A WIDE RANGE OF NUCLEAR SECURITY APPLICATIONS

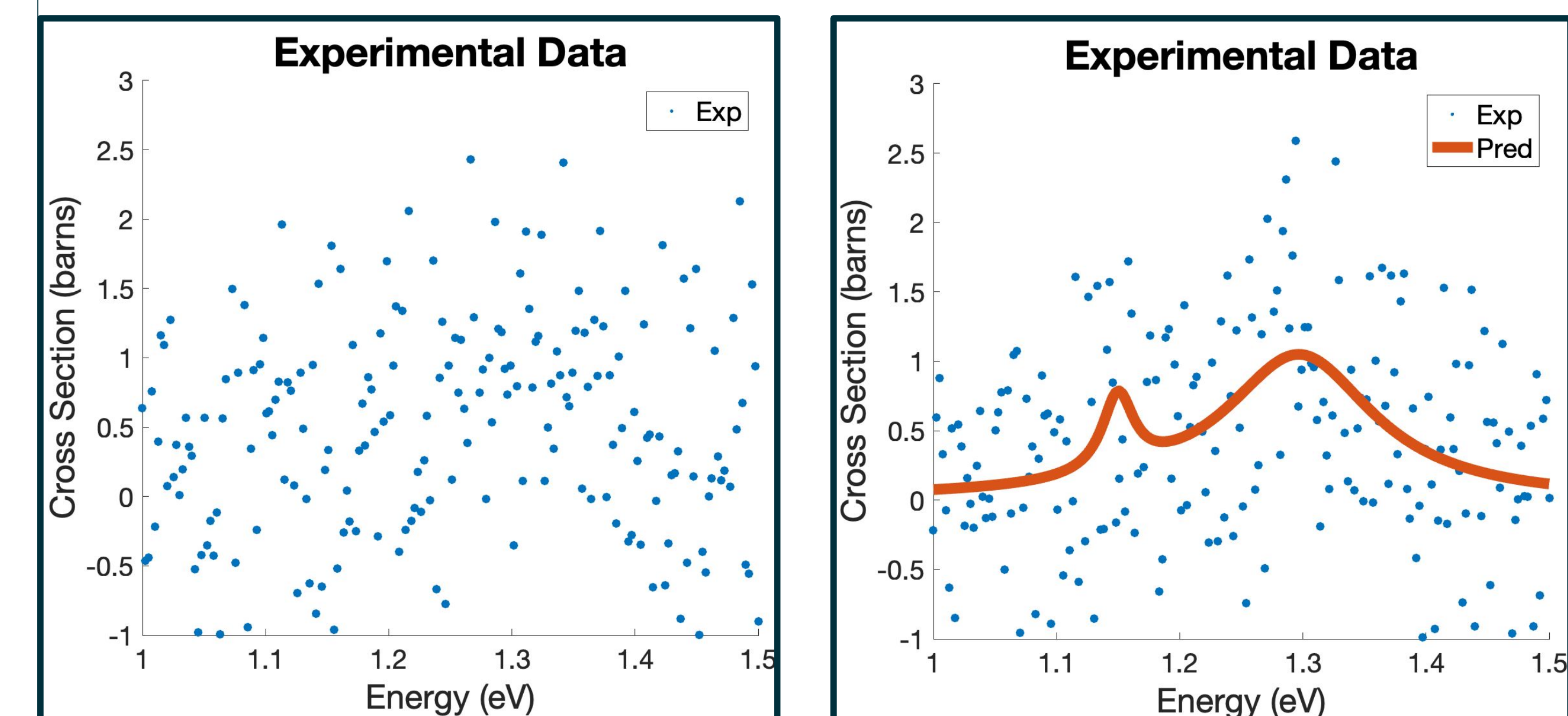
NON-DESTRUCTIVE ASSAY CALCULATIONS RELY DIRECTLY ON NUCLEAR DATA

SPECIFIC IMPACT:

IMPROVEMENTS IN THE ACCURACY OF NEUTRON CROSS SECTION DATA AND ASSOCIATED UNCERTAINTY WILL PROPAGATE THROUGH CALCULATIONS VITAL FOR:

- DETECTION
- IDENTIFICATION
- & CHARACTERIZATION OF NUCLEAR MATERIAL

Accurate Resonance Identification



Near-Term Goals

- Perform evaluation of real experimental data for U-238
- Compare accuracy/time to manual evaluation
- Apply synthetically trained machine learning – based uncertainty analysis and validate