



ER/NR discrimination

General presentation and future plans

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Summary

- 1. Introduction
- 2. Machine Learning approach
- 3. Datasets
- 4. Past studies results
- 5. Tasks

Introduction

ER/NR discrimination

- Studies started by Atul (A. A. Prajapati, "Multivariate Analysis for Background Rejection in CYGNO/INITIUM Experiment", PhD thesis (2024))
- Develop strategies to improve detection of events:
 - Signal efficiency (NR)
 - Background rejection (ER)



Machine Learning approach



(Igor Pains uses it for image trigger)

Datasets



New simulated data already arrived:

- Digitize the data with the new experiment config. (low gain, Quest).
 - \circ Digitization issues to be fix.
- For now, keep using old dataset for development of the algorithms.



Past studies results

Training data with Random Forest and Gradient Boosting



Feature importance evaluation

Past studies results

Background Rejection vs Signal Efficiency



Tasks

On going

- Development of algorithms using Feature-based Machine Learning:
 - Non-linear Classifiers: Random Forest, Gradient Boosting, etc
- Development of algorithms using Deep Learning:
 - Convolutional Neural Network
- Evaluate performance and compare the results

Future Plans

Currently starting

- Use the new simulated data as dataset for the models
 - New experiment configuration
 - Low gain
 - Quest camera

Some results already obtained in the past

Thank you for your attention!

Questions, suggestions?