

Methodology

Boosted Decision Trees

BDT: Flavour

Classification Results

- Baseline Model:
 - A **Boosted Decision Tree (BDT)**, a conventional machine learning algorithm.
 - Serves as a robust benchmark to quantify what's possible *without* per-voxel 3D information.
- Input Features: Total energy sums from different calorimeter sections:
 - ▶ FaserCal, RearCal, HCal, MuTag.
- *Strong on dominant classes:*
 - High recall (93%) for NuMu CC → strong MuTag signal.
- *Fails completely on rare signals:* 0% recall for NuTau CC.

Class	Precision	Recall
ν_e CC	0.74	0.60
ν_μ CC	0.81	0.93
ν_τ CC	0.00	0.00
NC	0.66	0.57

Pred	True ν_e	True ν_μ	True ν_τ	True NC
ν_e CC	9,579	1,219	250	1,911
ν_μ CC	4,116	74,208	1,640	11,757
ν_τ CC	0	0	0	1
NC	2,141	4,618	2,599	18,201