Results

SCNN + Transformer

SCNN + Transformer: Flavour

Classification Results

- Overall Accuracy improves from 77% (BDT) to **81%**
- The most significant improvement: ν_e CC:
  - Precision: 0.76%→ 0.89%, Recall: 0.60% → 0.84%
  - **Why?** MAE forces reconstruction of countless masked electromagnetic showers → learns generalizable representation of what a physically EM shower
- First Identification of Tau Neutrinos
  - The confusion matrix shows the model correctly identifies **11 true NuTaU CC events**
    - Promising first step: both the BDT had **0% recall**
  - **Why**? MAE created a feature space where rare events could became *separable* from the overwhelming background

Class	Precision	Recall
ν_e CC	0.89	0.84
ν_μ CC	0.82	0.94
ν_τ CC	**0.79**	**0.00**
NC	0.73	0.58

Pred.	True ν_e	True ν_μ	True ν_τ	True NC
ν_e	**13,395**	789	103	726
ν_μ	1,864	**72,208**	1,705	12,748
ν_τ	0	0	**11**	3
NC	603	3,537	2,596	**18,403**