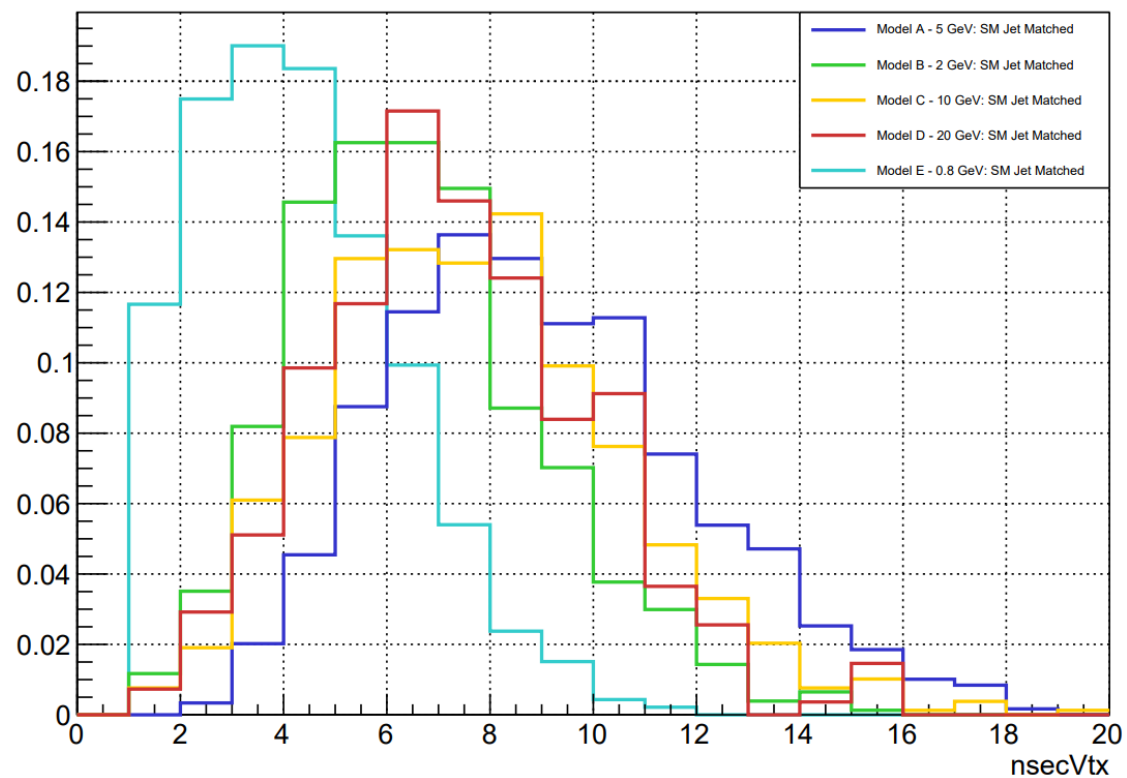# ADDITIONAL STUDY: MISMATCHED RECONSTRUCTION

- Using Truth and Secondary Vertices, investigate mis-matching of jets

- Study both:

  - SM jets reconstructed from Dark jets

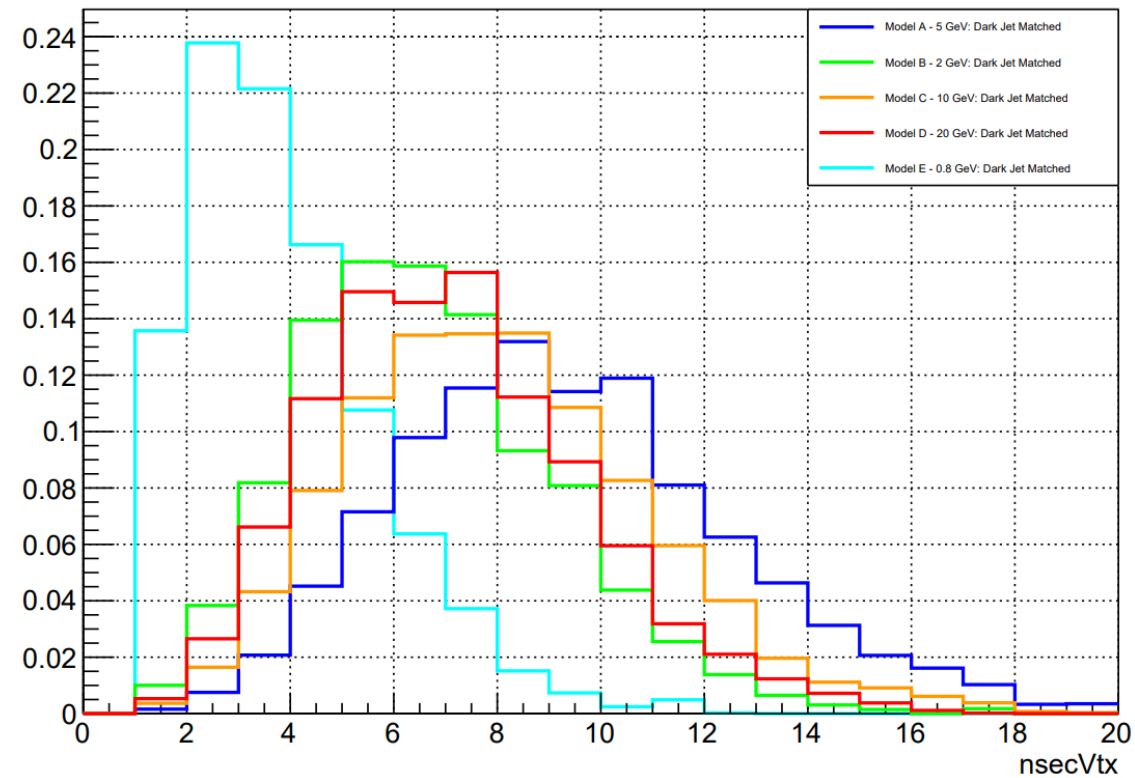 - Dark jets reconstructed from SM jets

Jet Matched Flag	Truth Vertex	Secondary Vertex
isTruthJetMatched	1	1
isDarkJetMatched	0	1
isTruthJetMatched	1	1
isDarkJetMatched	1	0

$\}$ SM jet → Dark Jet

$\}$ Dark jet → SM Jet
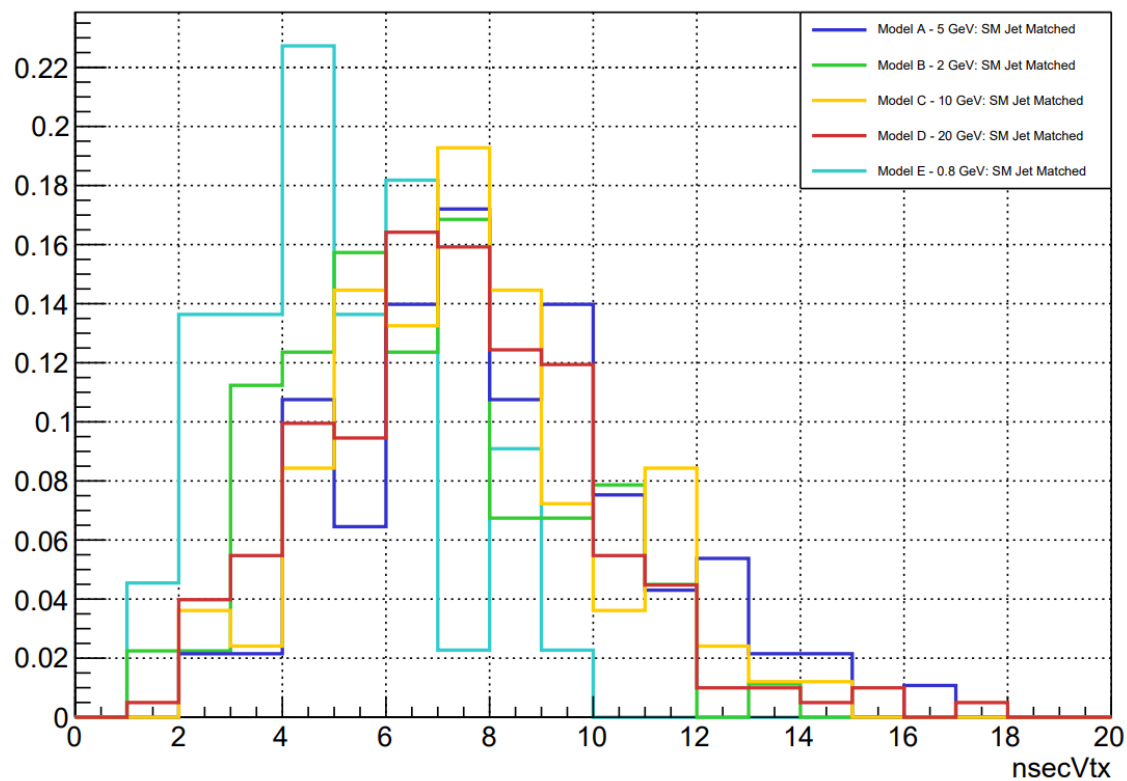
SM jet matched Sec. Vertices

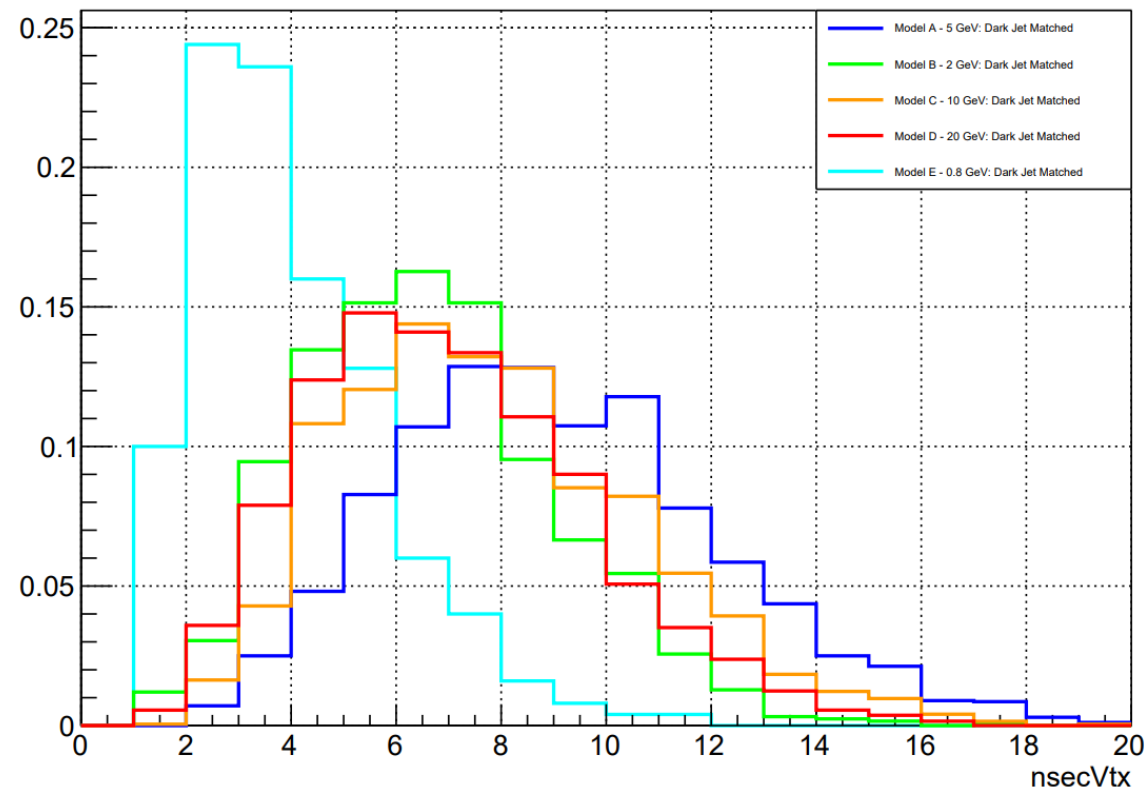## Dark jet matched Sec. Vertices

SM JET MATCHED TRUTH VERTICES

SM jet matched Sec.Vertices

Dark jet matched Sec.Vertices
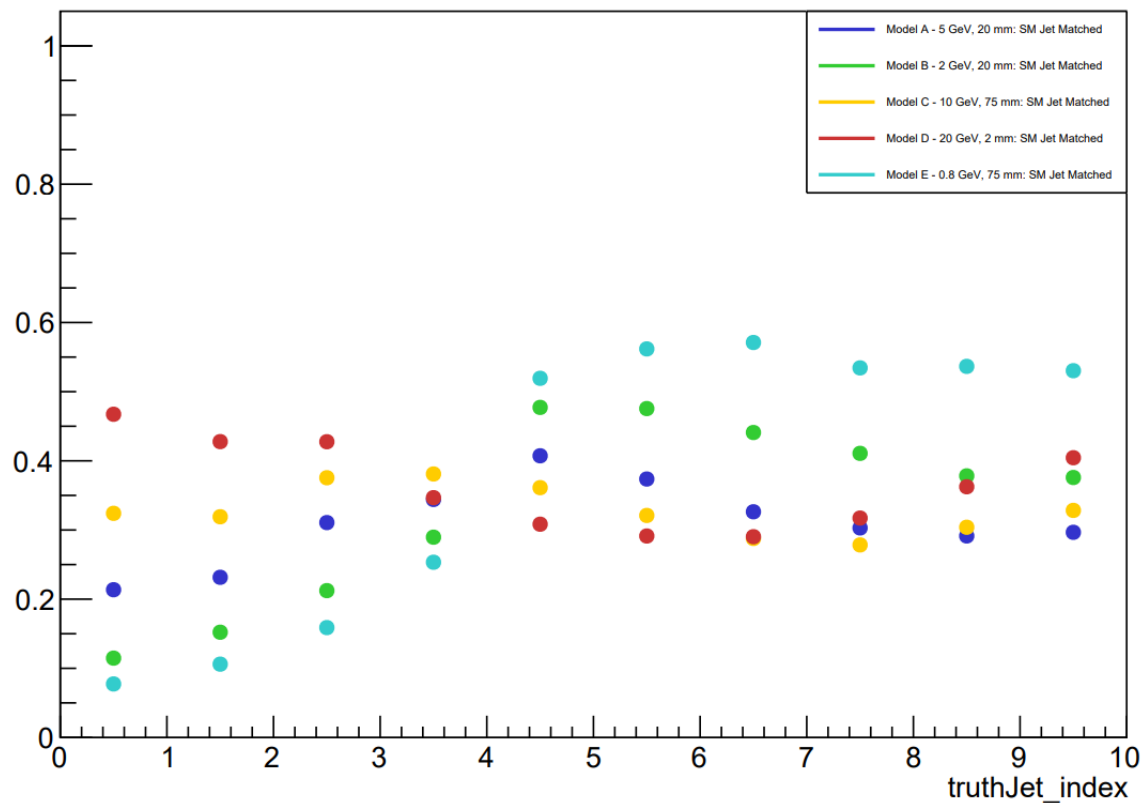
JET FRACTIONS:

- What fraction of the leading jets are Dark/SM?

  - At Truth Level
  - At Reco Level
  - For Truth Vertices
  - For Secondary Vertices

- $\text{truthJetRatio} = \dfrac{N(\text{truthJet\_isDarkMatched})}{N(\text{truthJet})}$

- $\text{recoJetRatio} = \dfrac{N(\text{jet\_isDarkMatched})}{N(\text{jet\_isTruthMatched})}$

- $\text{truthVtxRatio} = \dfrac{N(\text{truthVtx\_isDarkJetMatched})}{N(\text{truthVtx\_isTruthJetMatched})}$

- $\text{secVtxRatio} = \dfrac{N(\text{secVtx\_isDarkJetMatched})}{N(\text{secVtx\_isTruthJetMatched})}$

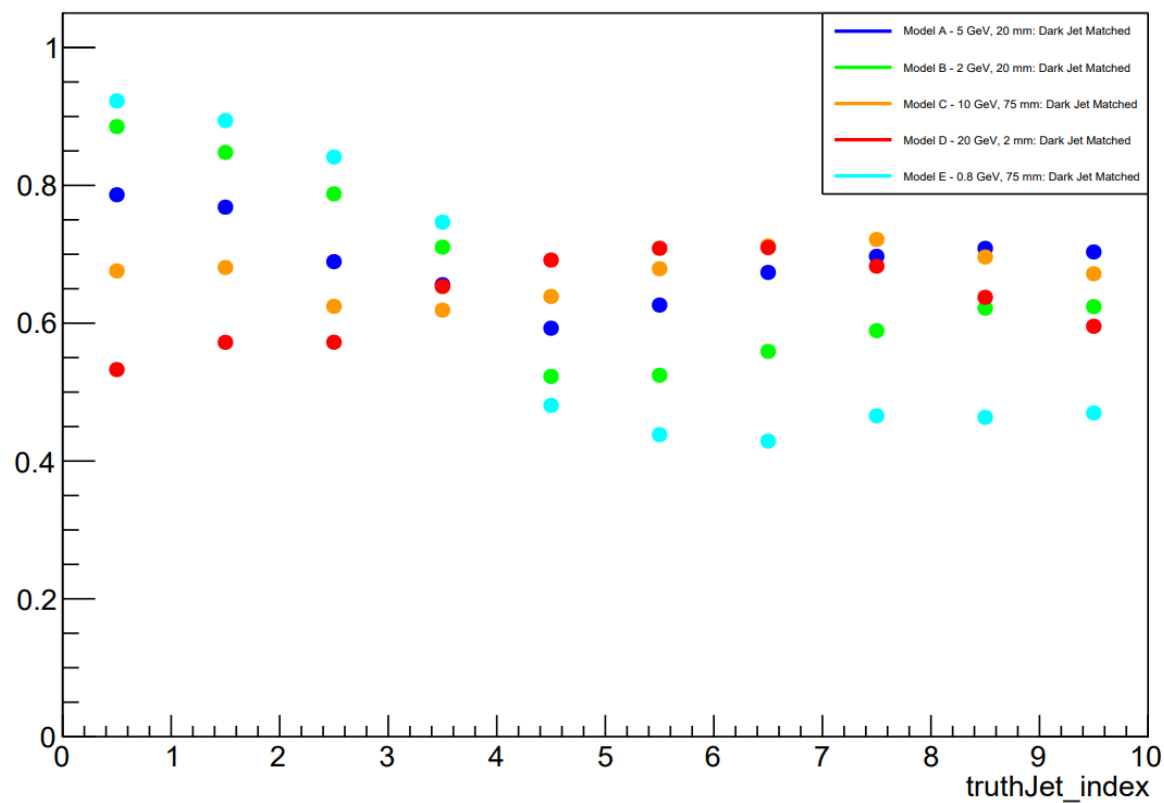*N in the ratios is not the n leaf, but rather the number of entries for the variable
**The following plots are not normalized since they are ratios

TRUTH JET FRACTIONS:
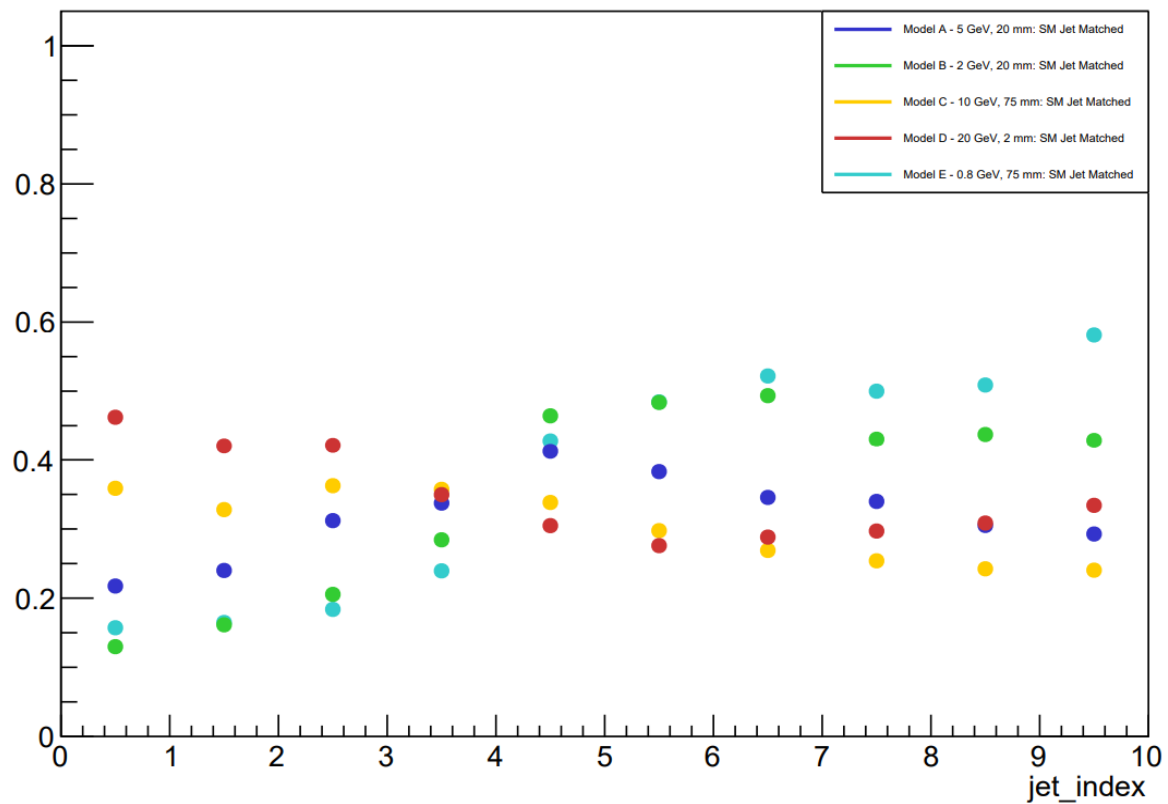

Fraction of Truth Jets which are SM Jets by Index

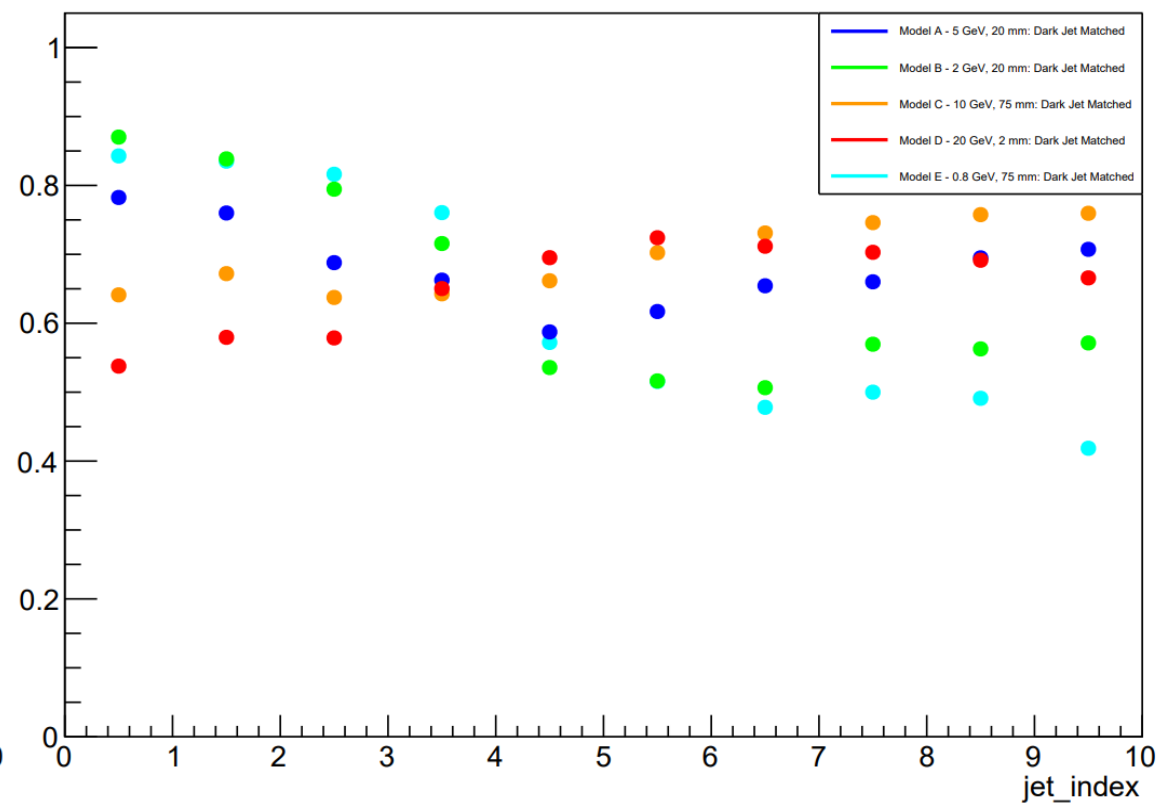Fraction of Truth Jets which are Dark Jets by Index

RECO JET FRACTIONS:
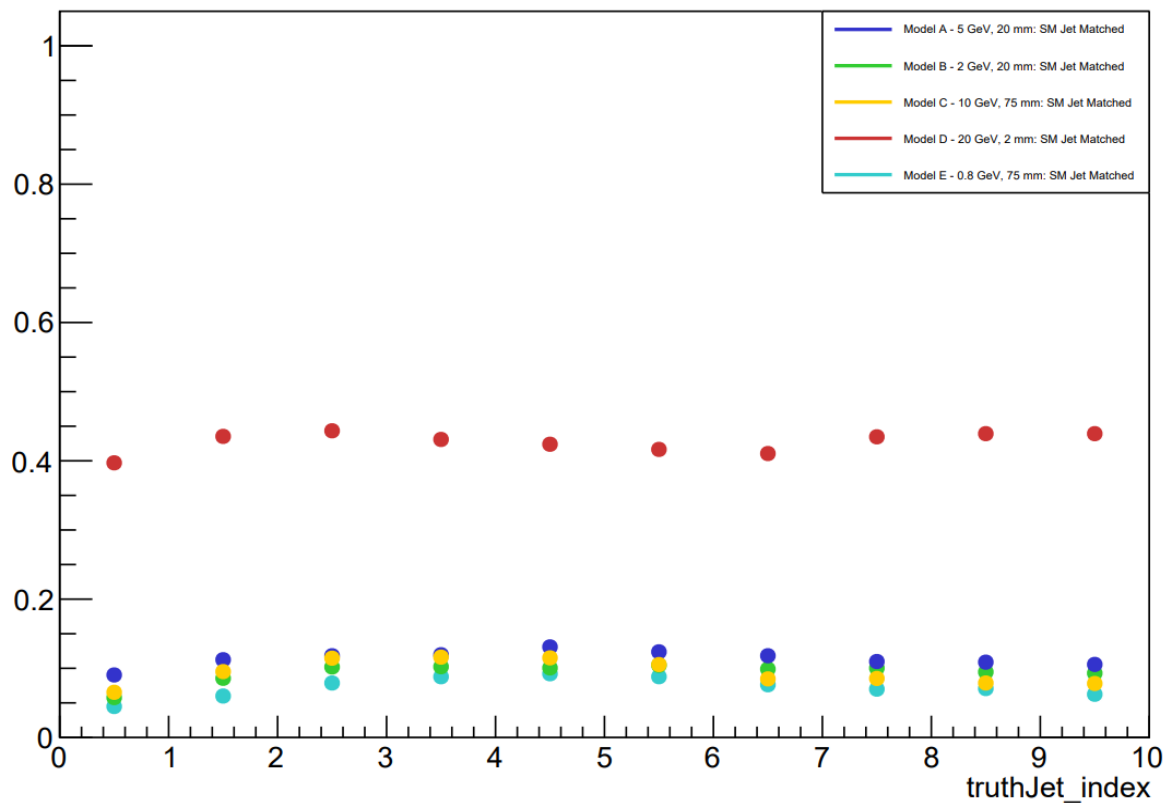

Fraction of Jets which are SM Matched by Index

- Model A - 5 GeV, 20 mm: SM Jet Matched
- Model B - 2 GeV, 20 mm: SM Jet Matched
- Model C - 10 GeV, 75 mm: SM Jet Matched
- Model D - 20 GeV, 2 mm: SM Jet Matched
- Model E - 0.8 GeV, 75 mm: SM Jet Matched

jet_index

Fraction of Jets which are Dark Matched by Index

- Model A - 5 GeV, 20 mm: Dark Jet Matched
- Model B - 2 GeV, 20 mm: Dark Jet Matched
- Model C - 10 GeV, 75 mm: Dark Jet Matched
- Model D - 20 GeV, 2 mm: Dark Jet Matched
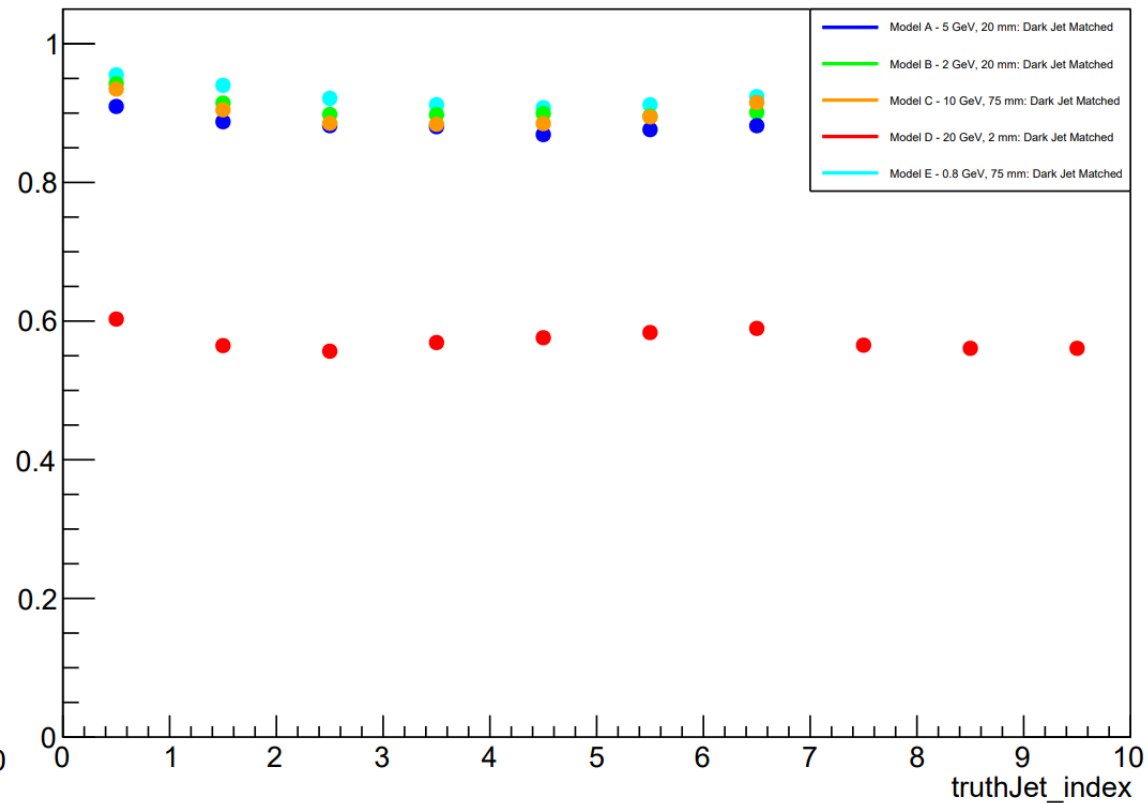- Model E - 0.8 GeV, 75 mm: Dark Jet Matched

jet_index

TRUTH VERTEX FRACTIONS:

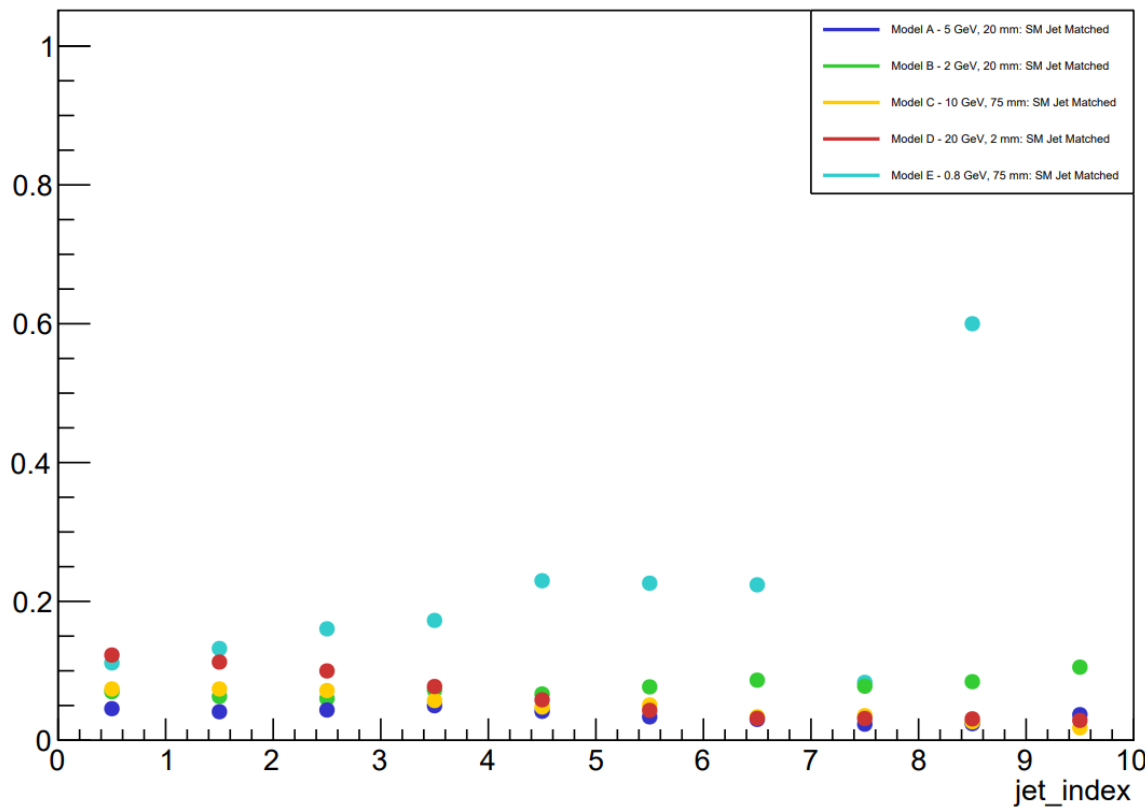Fraction of Truth Jets Where the Truth Vertices are SM Jet Matched by Index

Fraction of Truth Jets Where the Truth Vertices are Dark Jet Matched by Index

SECONDARY VERTEX FRACTIONS:

Fraction of Jets Where the Secondary Vertices are SM Jet Matched by Index

Fraction of Jets Where the Secondary Vertices are Dark Jet Matched by Index