Updates on Shower Classification Algorithm GlueX Calorimetry Meeting

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Updates on Shower Classification Algorithm

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Figure of Merit Studies

 Inclusive raw data used to conduct figure of merit and background reduction studies



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Figure of Merit Studies

- Figure of Merit (FOM) = $\frac{S}{\sqrt{S+B}}$.
- $\bullet~\mbox{Quality}>0$ imposed for both throughout to eliminate track matched showers



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Figure of Merit Studies

- FOM by number of tracks
- Peaks around 0.5 to 0.6 regardless of the number of tracks



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Background Reduction Studies

- Quality > 0.5, all numbers of tracks
- Signal retention $\approx 85\%$
- Background reduction $\approx 60\%$



Background Reduction Studies

- Quality > 0.5, nTracks > 4
- Signal retention $\approx 96\%$
- Background reduction $\approx 64\%$



- Using data from exclusive omega events used to train the algorithm and corresponding signal Monte Carlo
- Discriminating variables from data (right) vs. Monte Carlo (left)
- Red histograms represent the background split off showers, while blue represents signal photons



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Updates on Shower Classification Algorithm

- Discriminating variables from data (right) vs. Monte Carlo (left)
- Red histograms represent the background split off showers, while blue represents signal photons



- Discriminating variables from data (right) vs. Monte Carlo (left)
- Red histograms represent the background split off showers, while blue represents signal photons



- Output classifier from data (right) vs. Monte Carlo (left)
- Red histograms represent the background split off showers, while blue represents signal photons



Summary

- MLP implemented in recon code input variables stored in REST
 - will allow further validation and study of effectiveness with any topology
- Data to MC comparisons show some difference in input variable distributions
 - work ongoing to understand these differences
 - plan to try to quantify efficiency difference of a given quality cut

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