SLD Flavor-Tag

- Find seed vertices with ZVTOP
- NN selection of “good” seeds
- NN attachment of remaining tracks to “good” seeds

For selected tracks, calculate:

- Invariant mass, corrected for missing $p_T$
- Charged momentum
- Decay length of fitted vertex from IP
- Charged multiplicity

These are fed into a final NN for charm/bottom separation
NN inputs:

- Plots showing distributions of Mass and Momentum.
- Distribution of Decay Length and Track Multiplicity.

NN output:

- Plot showing distribution of NN Output.
**Projection to LCD**

Extrapolate SLD efficiencies to detector with better position resolution.

Start with tag efficiency vs. $B, D$ decay length:

![Graph of tag efficiency vs. decay length](image)

and decay length distribution:

![Graph of decay length distribution](image)

Then for a factor $s$ better resolution:

$$\epsilon_{new} = \int N(l) \epsilon(sl) dl$$
Results: b-tag

Calculate $\epsilon_{new}$ for various values of $s$ and $NN_{out}$ cuts, both for $b$ signal and $c$ background. These purities don’t include $uds$ contamination.

Can also calculate the efficiency to tag a $B$ with a particular vertex charge. The “charge purity” is the fraction of tagged jets where the vertex charge equals the charge of the underlying $B$-hadron.
**Results: c-tag**

Can get bigger improvements here. $D^0$ decays have a higher $N_{chg} \geq 2$ fraction than $D^\pm$ ones, so we see a higher fraction of vertex-able decays (top curve) as we look closer to the IP.

Since $N_{chg}$ is generally small, improvements in tracking efficiency would probably help here as well.

The efficiency just to find a vertex (no $c/b$ separation) plateaus at $\sim 0.5$. 