LHC studies - angles between quark and tracks in Z->qqbar

1. Plots for the distance between quark and tracks in Z->qqbar events from Pythia.
   - Angle in degrees, Pt(track) > 1 GeV
   - Angle in Delta R, Pt(track) > 1 GeV

2. 2-D plots angle vs. quark energy in Z->qqbar events from Pythia.
   - Abs(eta) = 0
   - Abs(eta) = 1
   - Abs(eta) = 2

3. Number of events with 1, 2, or 3 tracks in shrinking cone with zero or non-zero number of tracks in isolation cone in Z->qqbar events from Pythia.
   - Zero tracks in isolation cone
   - Any number of tracks in isolation cone
   - Zero tracks in isolation cone, shrinking isolation cone
   - Any number of tracks in isolation cone, shrinking isolation cone

Can we plot Fig. 1 and Fig. 2?

See the last 2 pages.

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$Z \rightarrow jj$

Any Number of Tracks in Isolation Cone

$N_{\text{track}} = 1$

$N = 2$

$N = 3$

$\eta = 0$

$\eta = 1$

$\eta = 2$

HW $\varepsilon = \frac{N_{\text{track}} = 1, 2, 3}{N_{\gamma}}$ as a function of $E_{\gamma}$
Is this a tracks in signal cone?

Zero tracks in Isolation Cone, Shrinking isolation Cone

With shrinking isolation cone starting at 20 degrees until about 30 GeV, then shrinking to 10 degrees at 100 GeV.

2 tracks in cone, n = 2 ± 0.1
Entries: 191
Mean: 133.1
RMS: 68.65

3 tracks in cone, n = 2 ± 0.1
Entries: 202
Mean: 157.2
RMS: 74.31

Two isolation cones?
Any number of tracks in isolation cone, shrinking isolation cone.

Is this 2 tracks in signal cone?

1 track in cone, $n = 1 \pm 0.1$
- Entries: 531
- Mean: 125.7
- RMS: 68.28

2 tracks in cone, $n = 2 \pm 0.1$
- Entries: 615
- Mean: 146.2
- RMS: 67.88

With shrinking isolation cone starting at 20 degrees until about 30 GeV, then shrinking to 10 degrees at 100 GeV.

Dose this include "zero" track?
\eta = x \text{, where } x = 0, 1 \text{ or } 2

\begin{itemize}
\item a) all quarks
\item b) quarks with \( N_{\text{track}} = 1, 2, 3 \) in signal cone
\item c) quarks with \( N_{\text{track}} = 1, 2, 3 \) in signal cone and \( N_{\text{track}} = 0 \) in isolation cone
\end{itemize}

\[ \phi = \frac{b_2}{a_2} \] as a function of \( E_g \)
Fig. 2

\[ \mathbf{q} = \mathbf{x} \quad \text{where} \quad x = 0, 1, \text{ or } 2 \]