Instructions for reinterpretation of EXO-21-014

We provide the efficiency of identifying a LLP decay as a TD-tagged jet in bins of the LLP transverse and longitudinal decay position. The samples used to compute the efficiency contain events with pair production of $\tilde{\chi}_1^0$ with a lifetime of 0.5 and 3 m, and considering the combinations of the $\tilde{\chi}_1^0$ decay modes considered in this search ($H\tilde{G} \to b\bar{b}\tilde{G}$ or $Z\tilde{G} \to q\bar{q}\tilde{G}$).
The efficiency is calculated on top of three acceptance definitions.

- Merged topology: the H (or Z) decay products are produced with an angular separation $\Delta R < 0.8$, and the H (or Z) has $p_T > 30$ GeV and $|\eta| < 1$.
- Resolved topology with exactly one quark in acceptance: the H (or Z) decay products are produced with an angular separation $\Delta R \geq 0.8$, and only one b-quark (or light quark) has $p_T > 30$ GeV and $|\eta| < 1$.
- Resolved topology with two quarks in acceptance: the H (or Z) decay products are produced with an angular separation $\Delta R \geq 0.8$, and both the b-quarks (or light quarks) have $p_T > 30$ GeV and $|\eta| < 1$.

The full simulation signal yield prediction can be reproduced within 3% (merged topology), 5% (resolved topology with 1 quark in acceptance), 7% (resolved topology with 2 quarks in acceptance). This nonclosure uncertainty is added in quadrature to the statistical uncertainty of each bin.
In order to recast this analysis, the generator level LLP mass, transverse and longitudinal decay positions are needed. Furthermore, we provide functions to determine the decay topology and the acceptance region, that require the generator level p_T and η of the H and Z, and the generator level p_T, η and ϕ of the quarks.
We do not include the p_T^{miss}, lepton and photon vetoes, $\Delta\phi_{\text{min}}$ cut efficiencies in the parameterization. However, these quantities can be calculated using generator level information. When recasting the analysis, these additional selections need to be implemented, to be consistent with applying all the selections described in the paper.
The parameterization is provided as two dimensional histograms, in bins of the LLP transverse and longitudinal decay position. Each histogram correspond to one topology, and one LLP mass. We consider a mass range from 127 GeV up to 1800 GeV. The functions needed to load the efficiency maps, determine the decay topology, and predict the probability of an LLP decay to be identified as a TD-tagged jet are provided in the python file `efficiency_maps.py` in attachment. The two dimensional histograms are also provided as `ROOT` files.