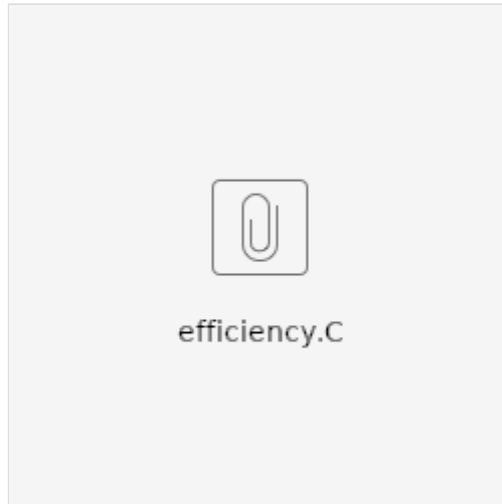
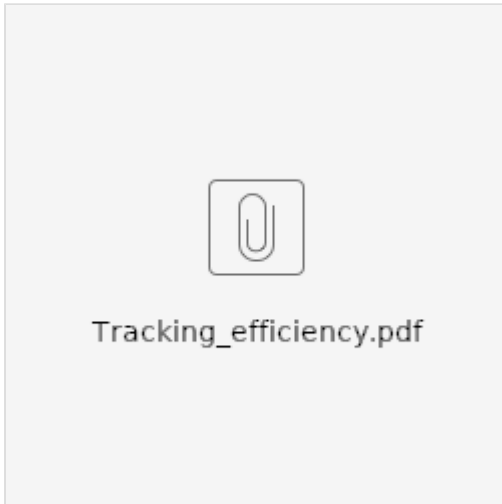


# Low Delta(M) Higgsinos



The tracking efficiency for chargino events.



This plot shows how many of the groups created by the grouping algorithm are identified as signal, aalow pt overlay and mix of both. Here only the sample where both the chargino decay tracks are reconstructed.

The model studied is a SUSY model with the lightest bosinos being higgsinos.  $\tilde{\chi}^0_2$  and  $\tilde{\chi}^{\pm}_1$  are mass-degenerate, and very close ( $\sim 1$  GeV) in mass to  $\tilde{\chi}^0_1$ , which is the LSP. No other SUSY particles are assumed to be produced at ILC energies. The very low mass differences implies that the signal events resembles gammagamma events. Therefore, it is required that the signal events are accompanied by a detected ISR photon

This benchmark in particular can probe four features:

- Detection of very low pt tracks.
- Identifying these particles.
- Detecting, identifying and measuring ISR photons.
- Identifying and rejecting tracks for gammagammalow pt hadrons and beam-strahlung.

In addition, as for any missing pt-signal, hermeticity is also important.

## Main observables.

The main direct observables for the signal are the momentum and identity of the visible decay-products of bosino decays, and the properties of the ISR-photon. With these observations, the masses of the SUSY particles can be reconstructed. The physics observables are the masses of the three SUSY particles and the production cross-sections.

As a main background, also the properties of the gammagammalow pt hadrons is a main output: Cross-sections, branching-ratios to different vector-mesons, production vertex position.

## Optimisation deliverables.

- Track-finding efficiency for very low pt-tracks.

- ISR photon identification performance.
- Efficiency to find multiple (main) vertices

## People

Main investigator: [Swathi Sasikumar](#) , assisted by [Jenny List](#) and [Mikael Berggren](#), reviewed by [Akimasa Ishikawa](#).

## Code

The GitHub repository is [ILDbench\\_lowDMHino](#) in the ILDAAnaSoft project.

## References.

Previous study (partly based on SGV, no low-pt hadron and beam-strahlung overlay): 'Tackling light higgsinos at the ILC', EPJC (2013) 73:2660, [arXiv:1307.3566](#)