# Simulated Samples in Tracker: Status and Future Need

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# Available samples for the tracker TDR: e+laser

- 4 fully simulated BXs of $\xi = 3$ with weight=1 (~125 e+/BX)
  - Thanks to Yee and Federico for identify these samples with weight~1.
  - fully digitised and clustered
- 4 fully simulated BXs of $\xi = 7$ sample with weight=1 (~4e4 e+/BX)
  - fully digitised and clustered
  - **brute-force clustering is not enough**
- 4 fully simulated BXs of $\xi = 10$ sample with weight>>1
  - (~3e4 e+/BX, no digitisation)
- some more samples with weight≠1
  - not used so far
- ~2 fully simulated BXs of background only
  - fully digitised and clustered **(leading to ~7k bkg clusters per layer - can we run "faster" sim here and produce more bkg BXs?)**
- - Signal+Background samples:
  - all signals are merged with the 2 BXs (alternating) of the bkg and digitisation+clustering is redone

# Track reconstruction:

## Status:

- After reconstruction algorithm tuned for the low multiplicities ( $< \mathcal{O}(1 - 200)$):
  - we see very few bkg-only tracks
  - 0 bkg tracks after a trivial selection
  - even in the presence of up to 100s of signal particles
  - Hope that this will stay with more BXs, but we need many more bkg BXs to confirm that ( $> \mathcal{O}(100)$)
- After reconstruction algorithm tuned for high multiplicities ( $> \mathcal{O}(5 \times 10^2 - 10^4)$):
  - we see the efficiency dipping where the bulk of the distribution is (~5-6 GeV) for the s+b processing but not for the s-only.
  - Work going on to improve this.
  - need to improve the shielding plan to reduce the bkg as significantly as possible

# Linearity Study for the Tracker

- Used the two unweighted samples in the following way:
  - multiplicities below 50 were taken from the $\xi = 3$ sample.
  - multiplicity of ~125 were taken as the full $\xi = 3$ sample.
  - multiplicities above ~125 were taken as the $\xi = 7$ sample.
- The underlying E, $p_x$, $p_y$,… distributions at the IP are slightly different between the different $\xi$ points
  - this leads to a slightly different behaviour at the detector, so this has to be repeated with unweighted samples if possible.

# Flat E signal samples:

- Used these to fold in the non-uniform B-field and predict the energy and positions
  - this is done with our fast sim code.
  - this is done to equally populate the full volume of the detector (going to the lowest relevant energies).
- **We need equivalent full-sim flat-E samples with enough stats (now we use 500 BXs with 100 tracks per BX).**
- With the help of Sasha we've found a problem in the lxsim.
  - there was one extra volume of the vacuum chamber that had led to a bias in the position of the particles by a few mm's.
  - there was a systematic offset in energy of ~3.5%.
    - we are now fixing this by hand in the existing samples, that is shifting the x position of the clusters by a factor of 1.033.