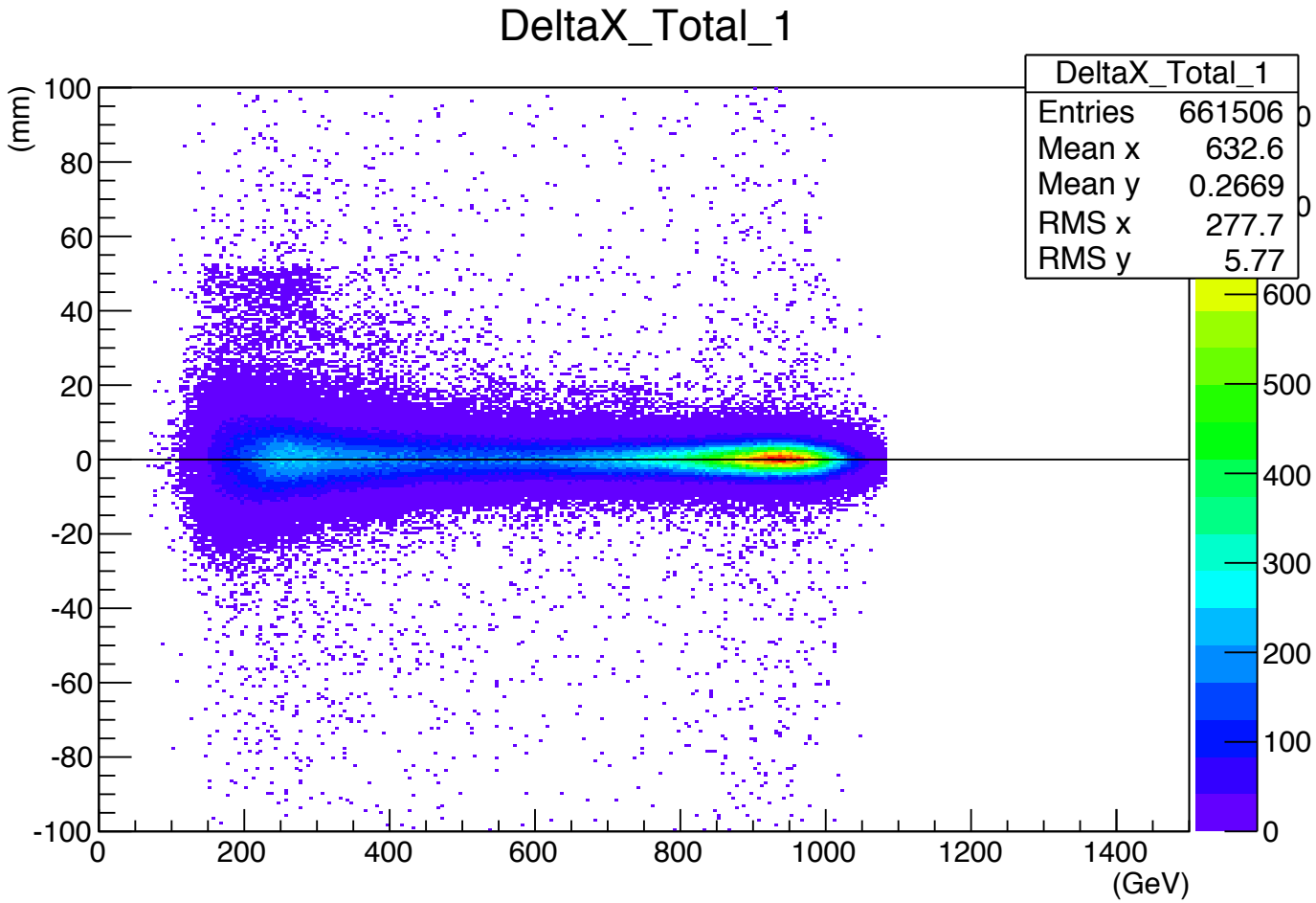
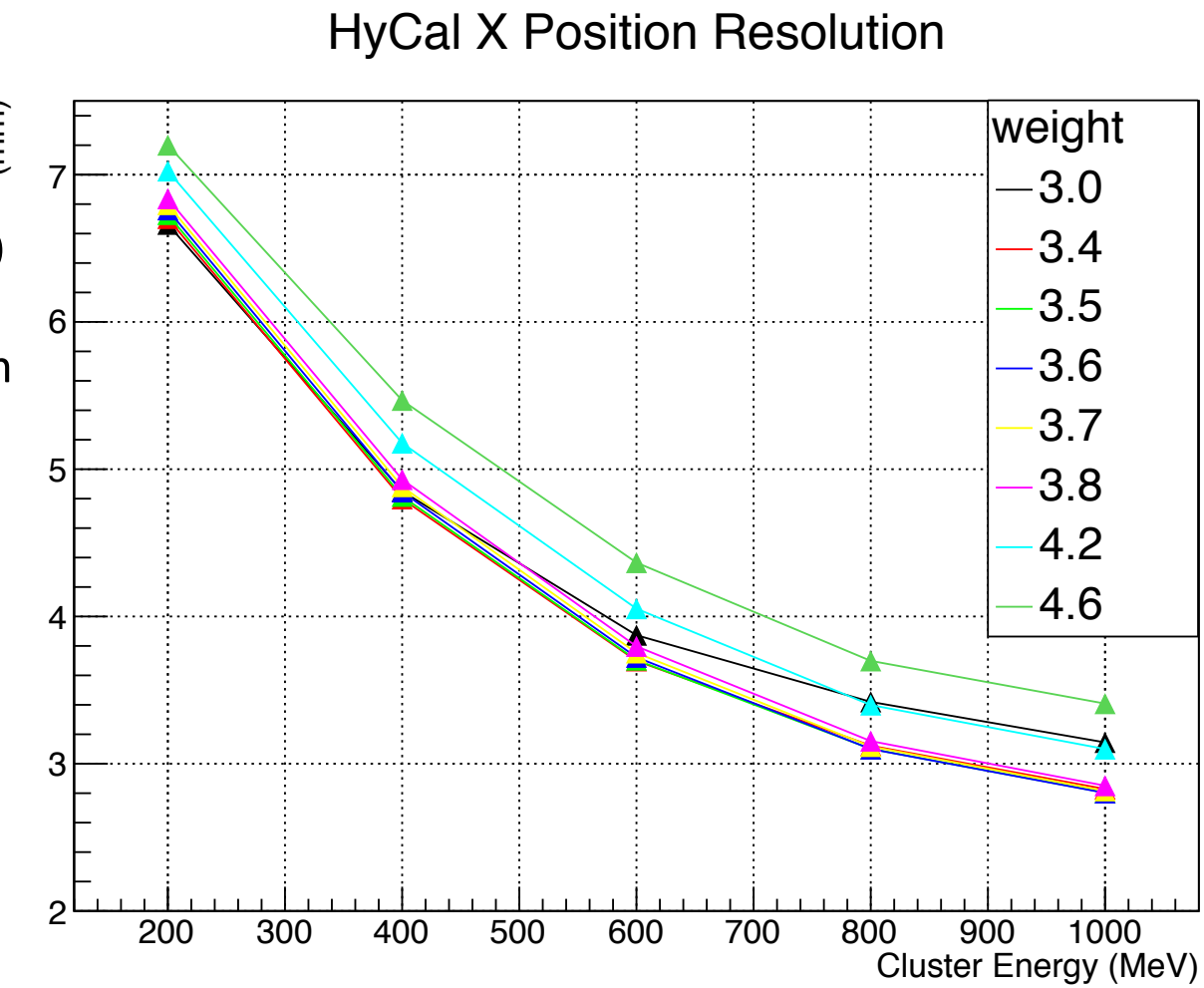
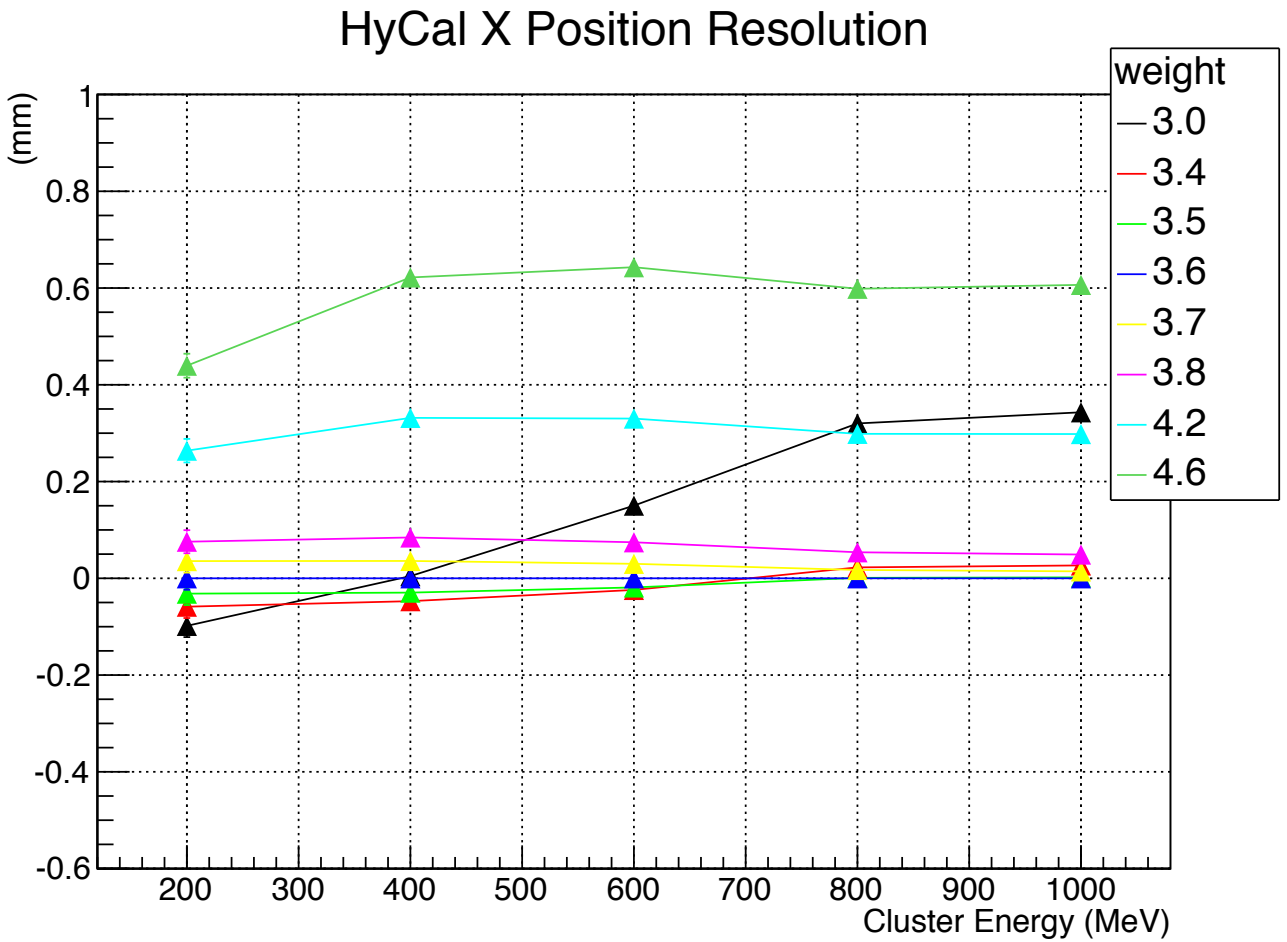
X-coor difference between GEM hits projected on HyCal and HyCal reconstructed position (using double-arm Moller, PWO only)

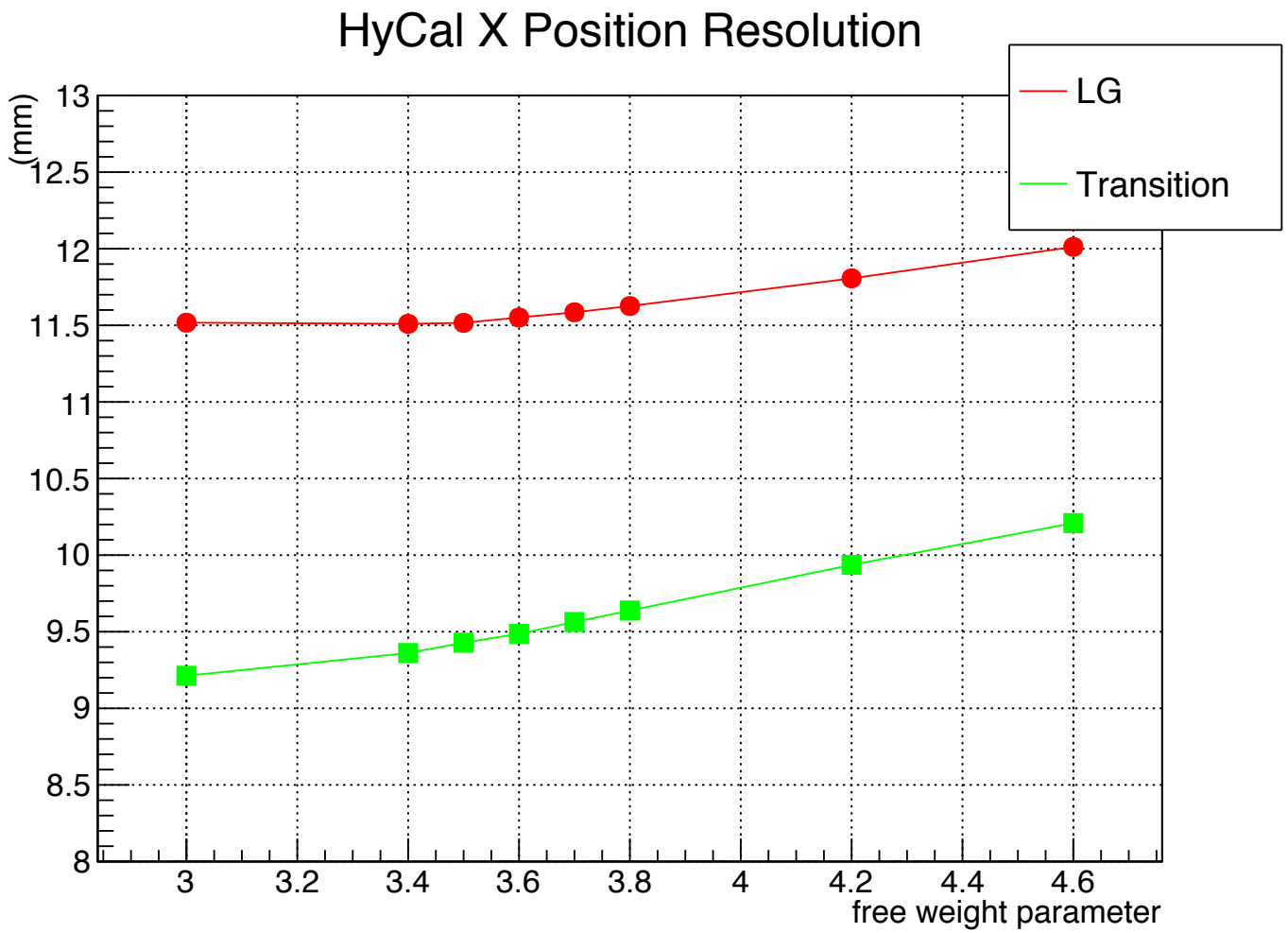


- $W = MAX(0, a + \log(E_i/E))$
- Sigma of the Gaussian fit from the previous 2D histogram, sliced into 5 1D bins on energy
- 8 different curve corresponds to 8 different weights

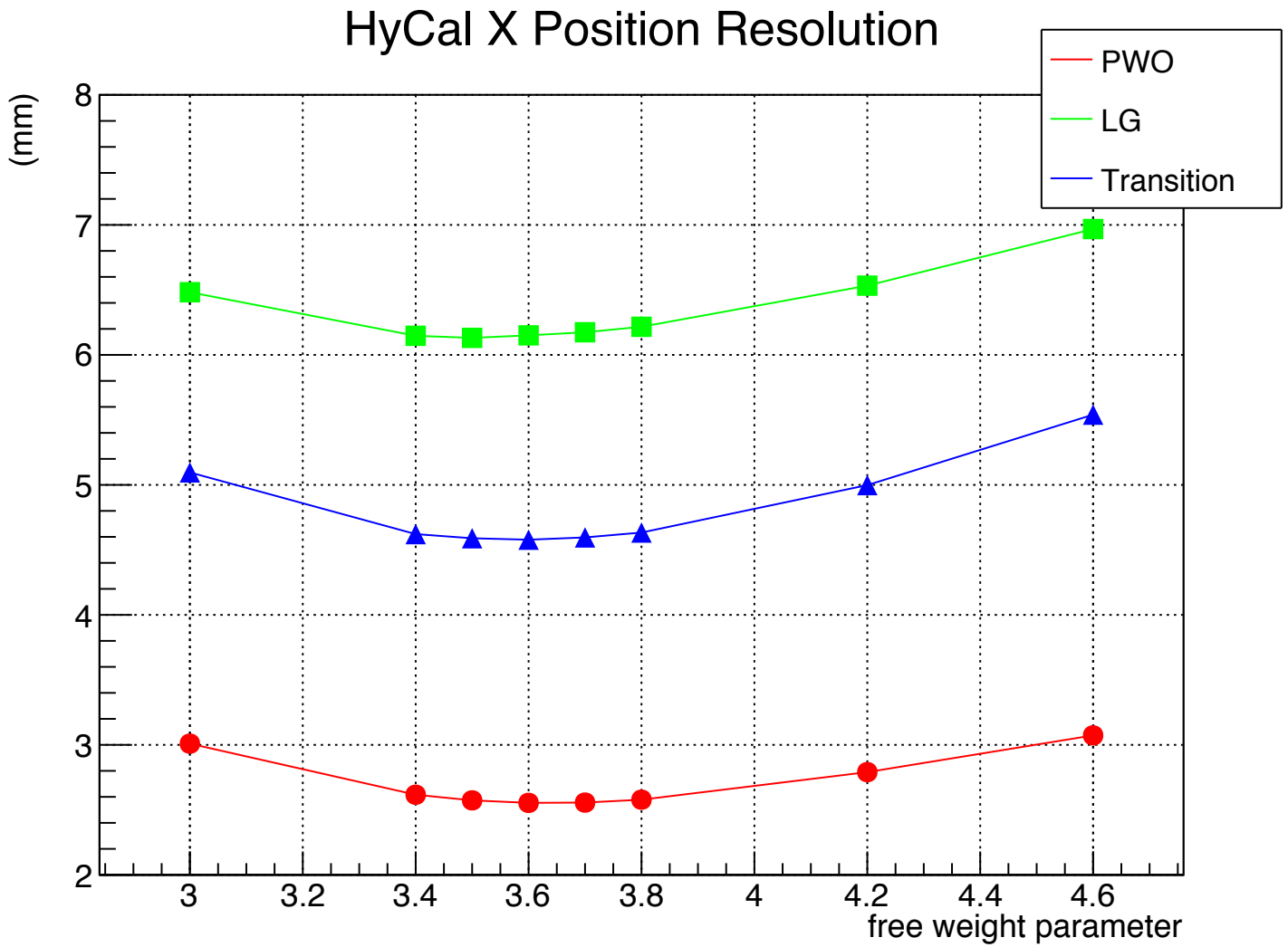


- Same plot as the previous one, but relative to the curve corresponds to 3.6
- Small weight seems to work better at low energy

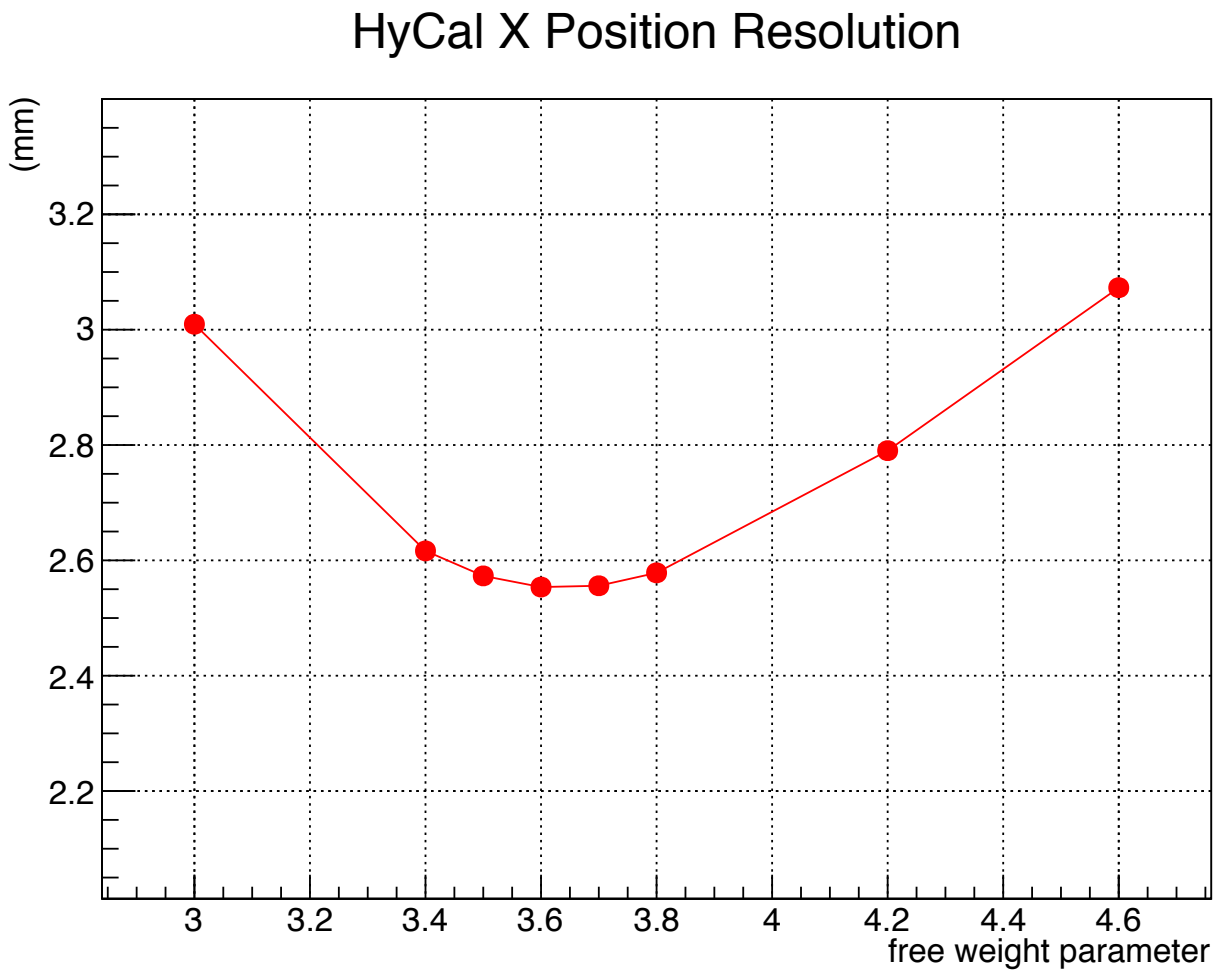




- Moller typically has a energy ~200 MeV near transition and ~150 MeV in LG



- Position resolution for ep events in the three different region on HyCal



- Just a zoom-in look for the PWO ep event resolution

- HyCal position resolution seems quite good (<3mm in PWO, ~1cm in LG and transition)
- Matching efficiency quite good (~93% with carbon run, using high energy ep events candidates)
- Searching region for matching can be made a lot smaller, and it should be position and energy dependent

- Shower depth has not been corrected
  - important if we want to make a “perfect” match between GEM and HyCal, and also calibrate the HyCal z position to a accurate level
  - Position resolution should be slightly better after shower depth correction

To-do

- Continue study various property of HyCal using GEM and HyCal itself
  - Position and energy resolution
  - Shift in z, shower depth, other models in estimating position

- Physics calibration using ep and ee events
  - Will work with Li on calibrating HyCal in the traditional way
  - Possibility of using GEM to calculate the expected energy on HyCal, potential to improve calibration near dead modules, edge and transition area

- Continue develop PRadEventViewer with Chao