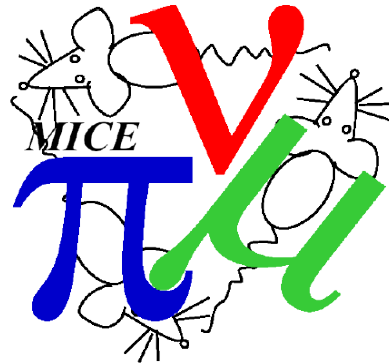


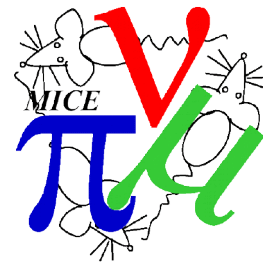


Emittance Evolution

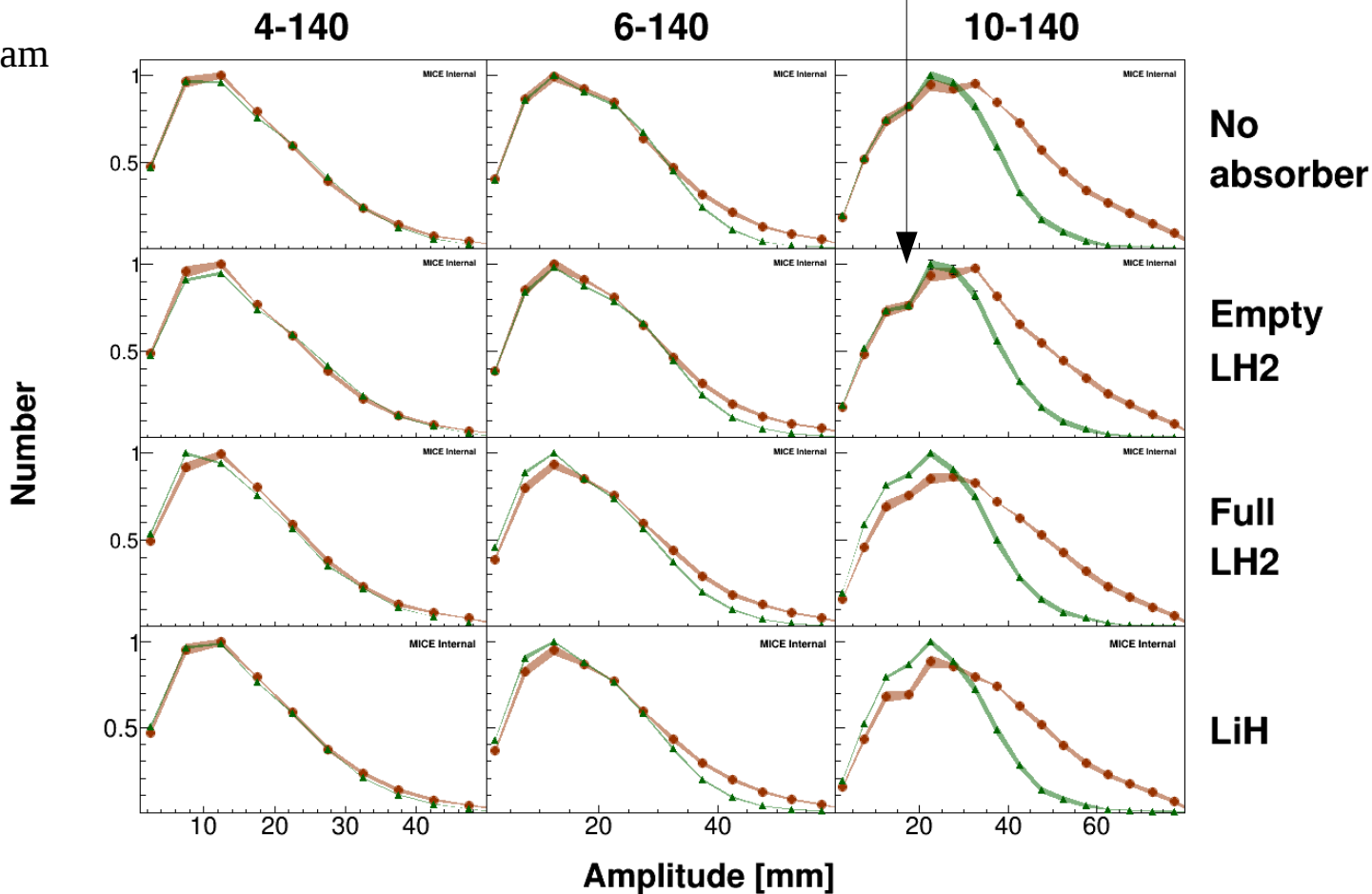


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Rutherford Appleton Laboratory

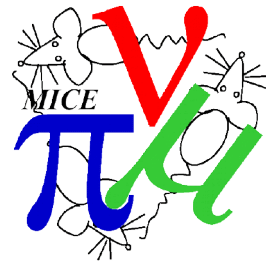
Fig. 3



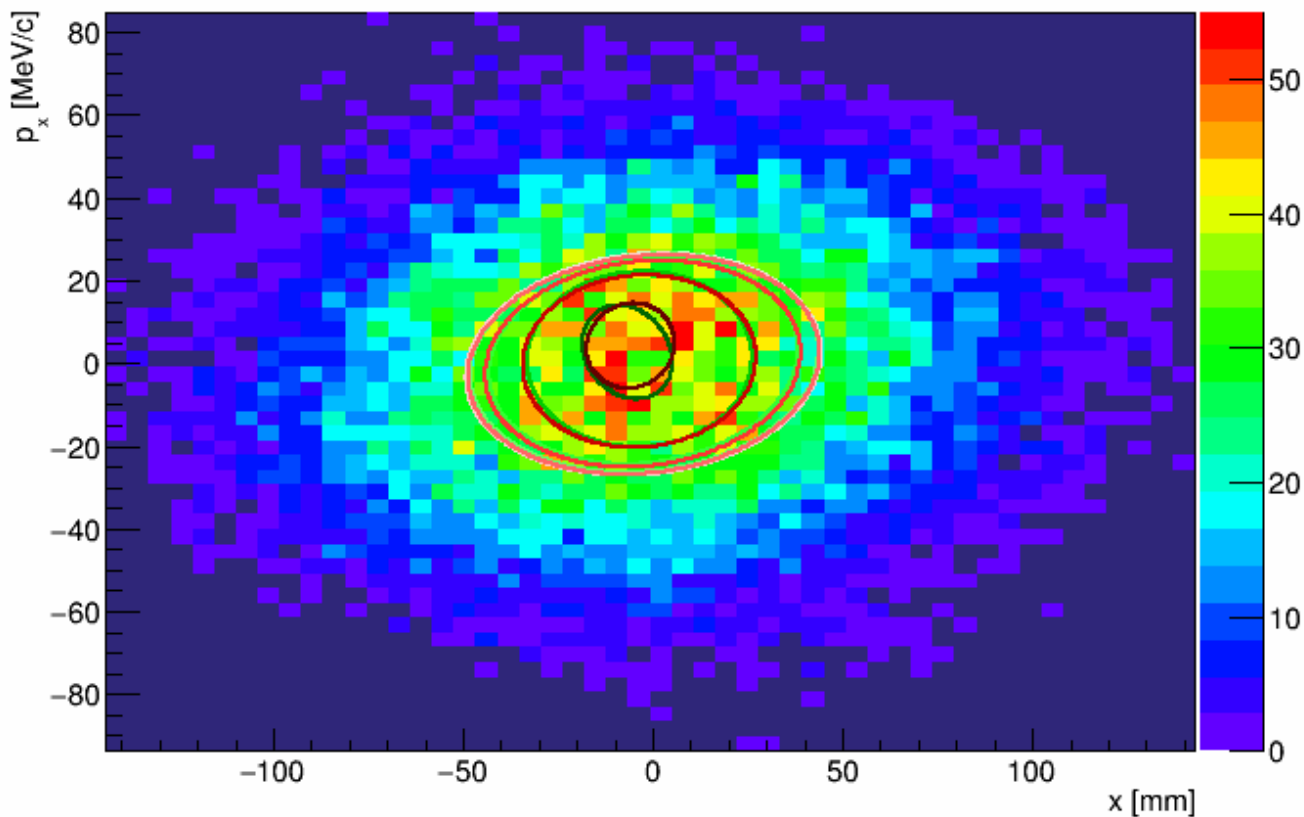
▲ Downstream
● Upstream



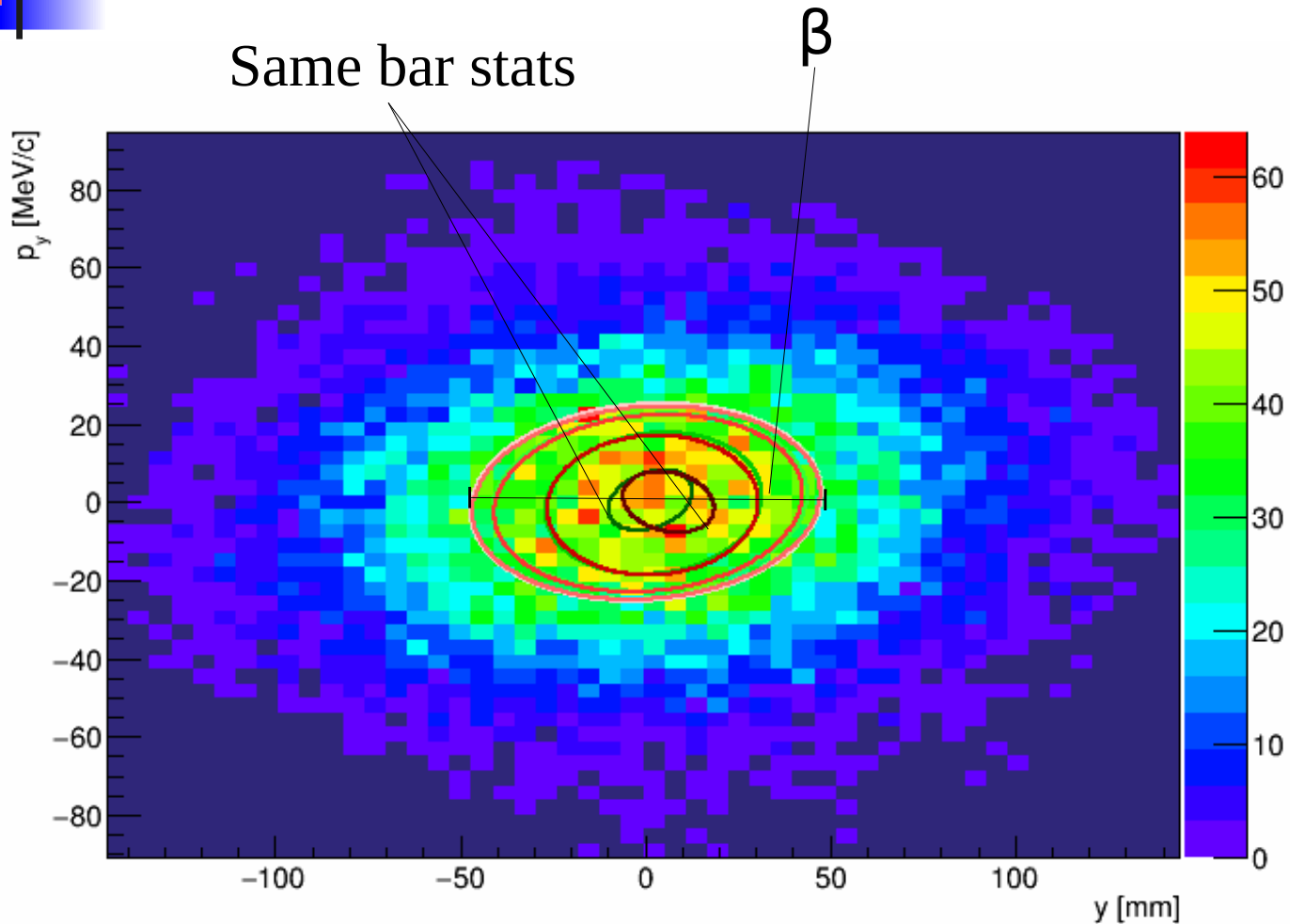
Amplitude routine



- Normal amplitude is
 - $A = \varepsilon_n u^T V^{-1} u$
- V is covariance matrix; susceptible to tails of distribution
- Introduce modified calculation uses V only for events in the same A bin and lower
 - Iterate over all events in the A bin until there are no more migrations to higher A
- At low A fewer events are included in the calculation
 - V becomes dominated by statistical effects

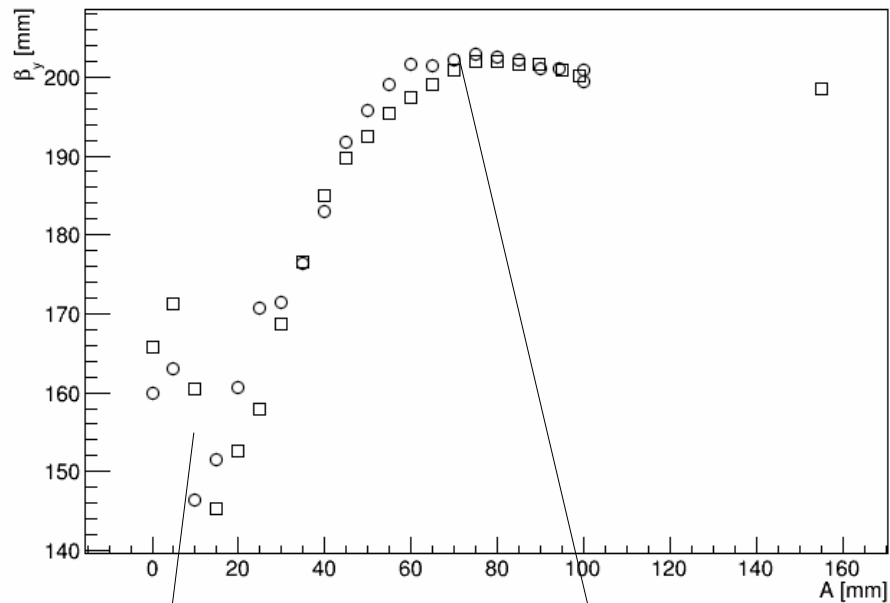
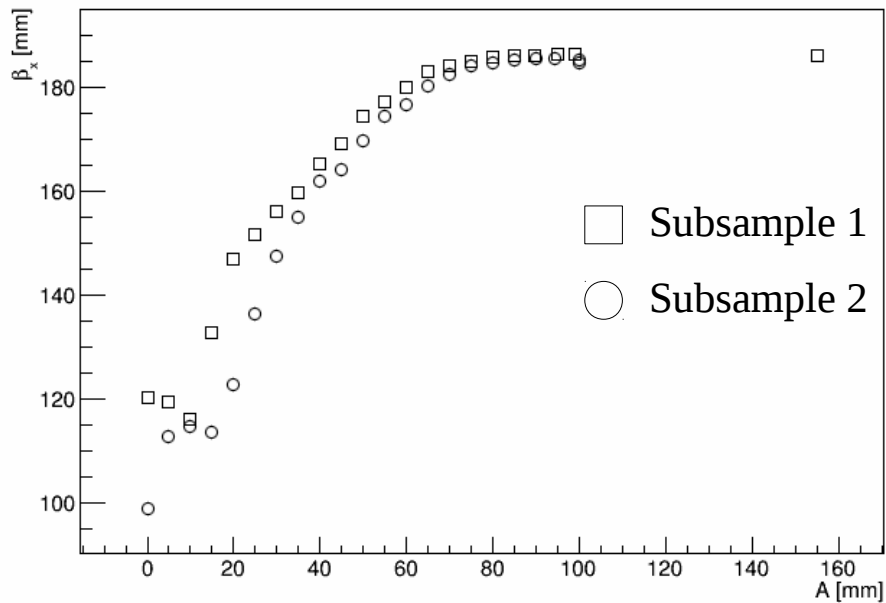
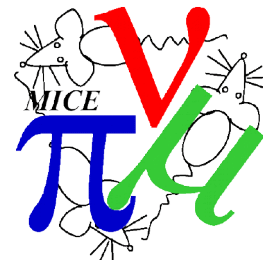


- E.g. x - p_x space
 - Two series of ellipses shown for two independent subsamples
 - “Green” vs “red” (light green at higher A , dark green at lower A)
 - Significant difference between subsamples for smallest ellipse



- E.g. y - p_y space
 - Difference between subsamples is worse
- Characterise by β , the width of the ellipse normalised by the area

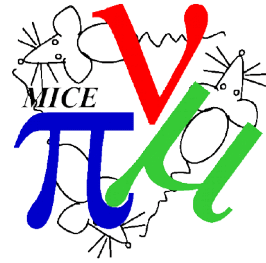
Beta x/y vs bin



Statistical
variation

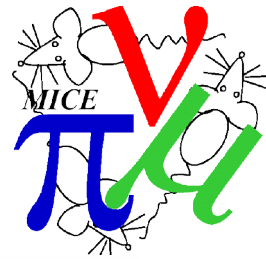
Well
conditioned

Amplitude routine

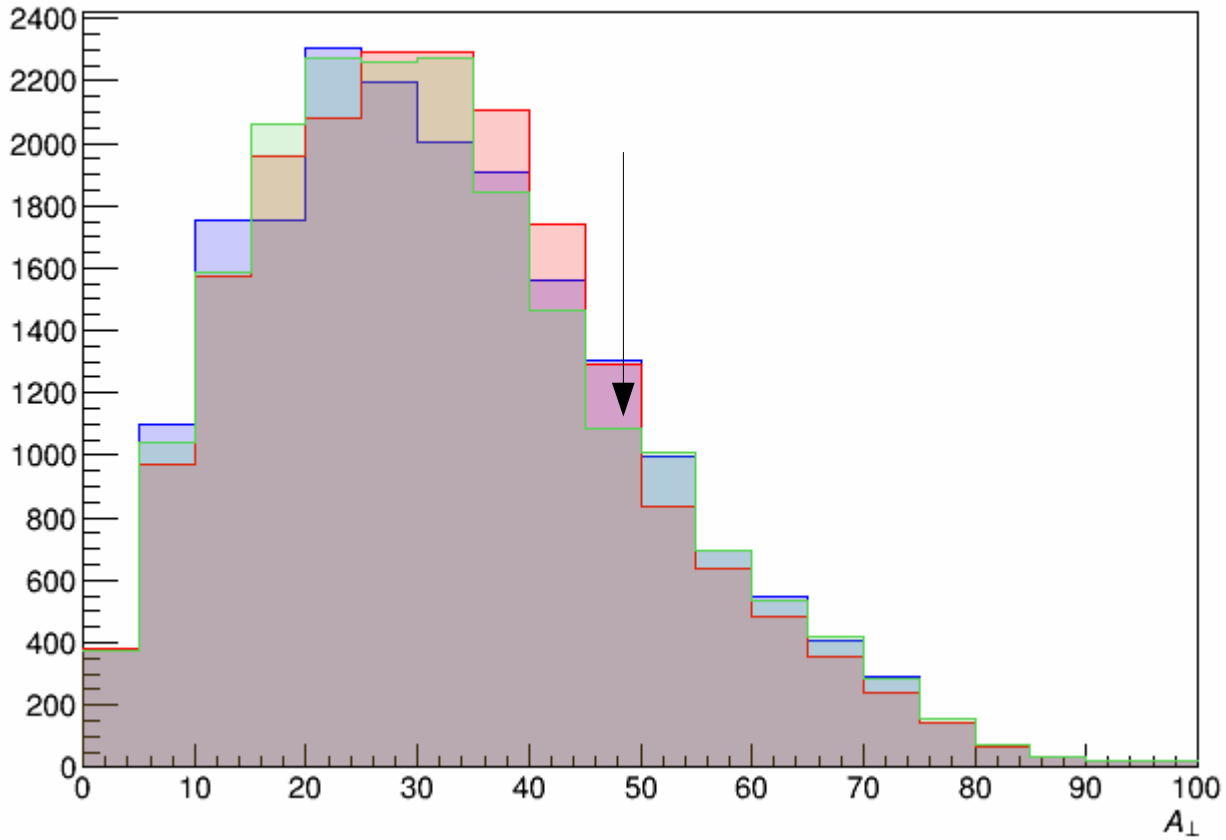


- In order to combat statistical effects, do not recalculate V when bin number is less than <some value>
- What happens when I vary <some value>

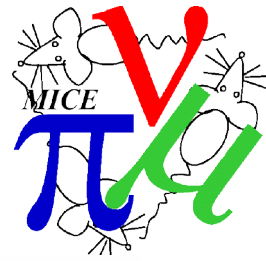
Bin 10



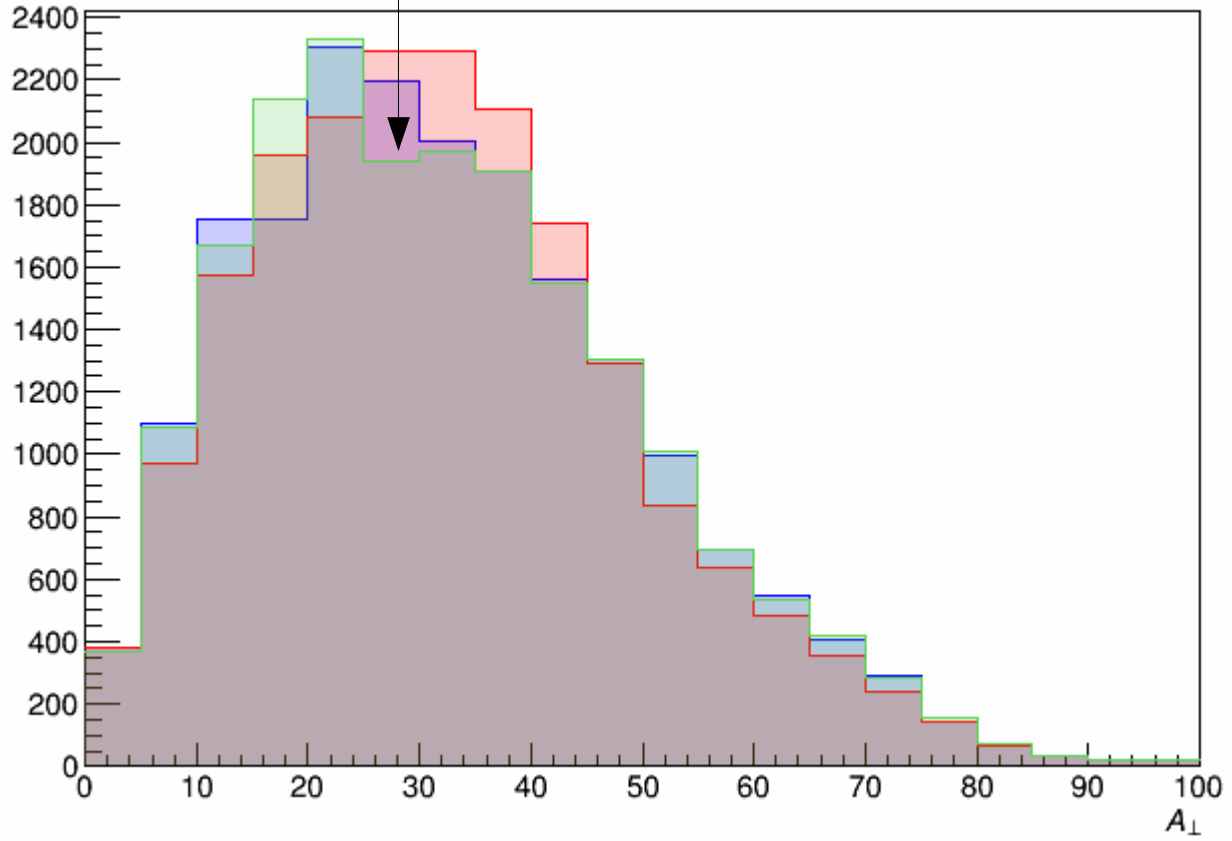
- Paper
- RMS covariances
- Different bin cut



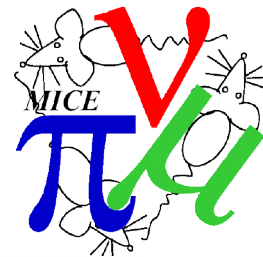
Bin 6



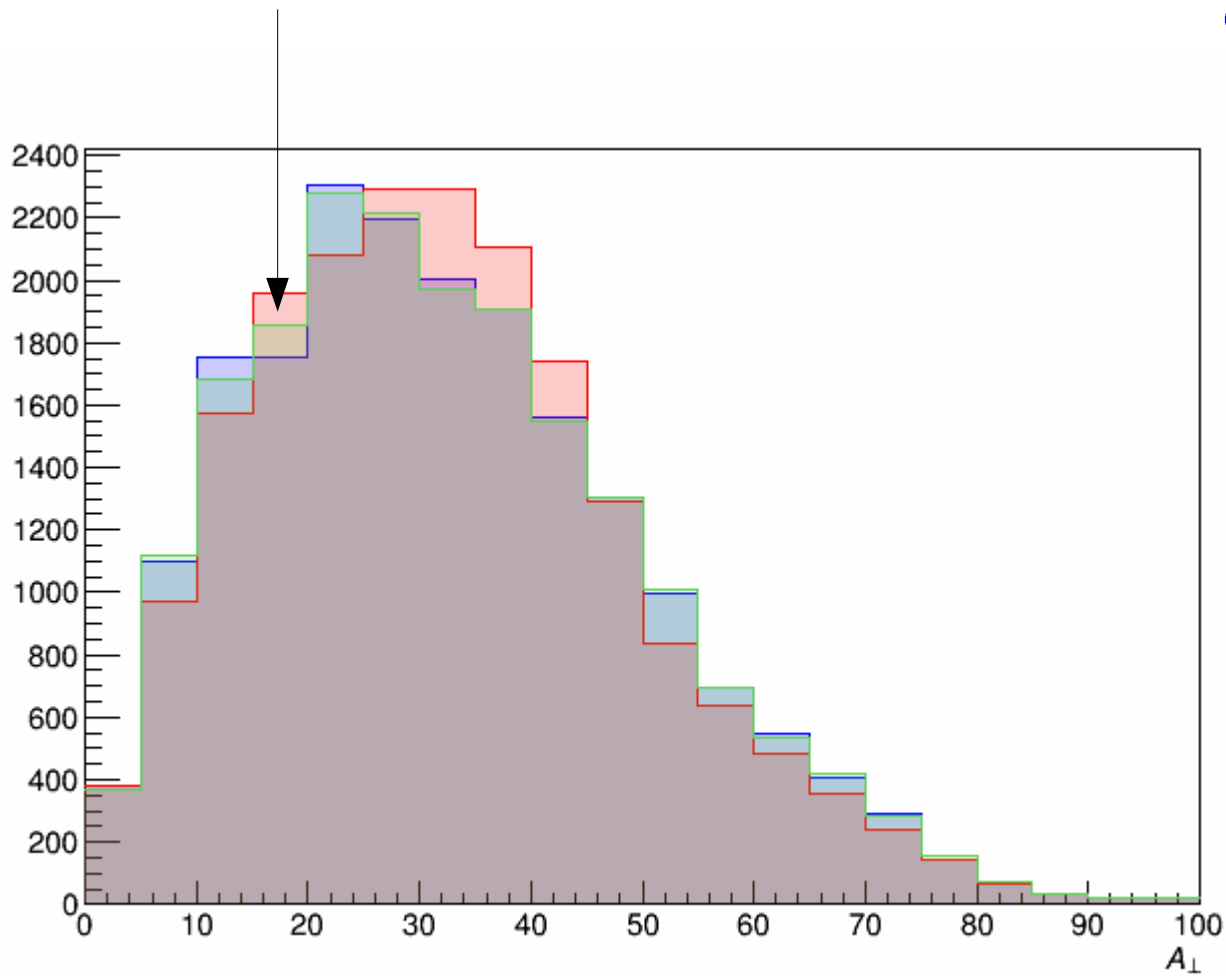
- Paper
- RMS covariances
- Different bin cut



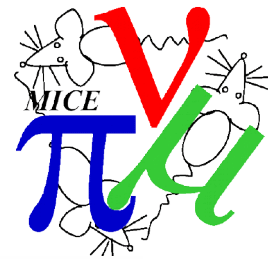
Bin 4



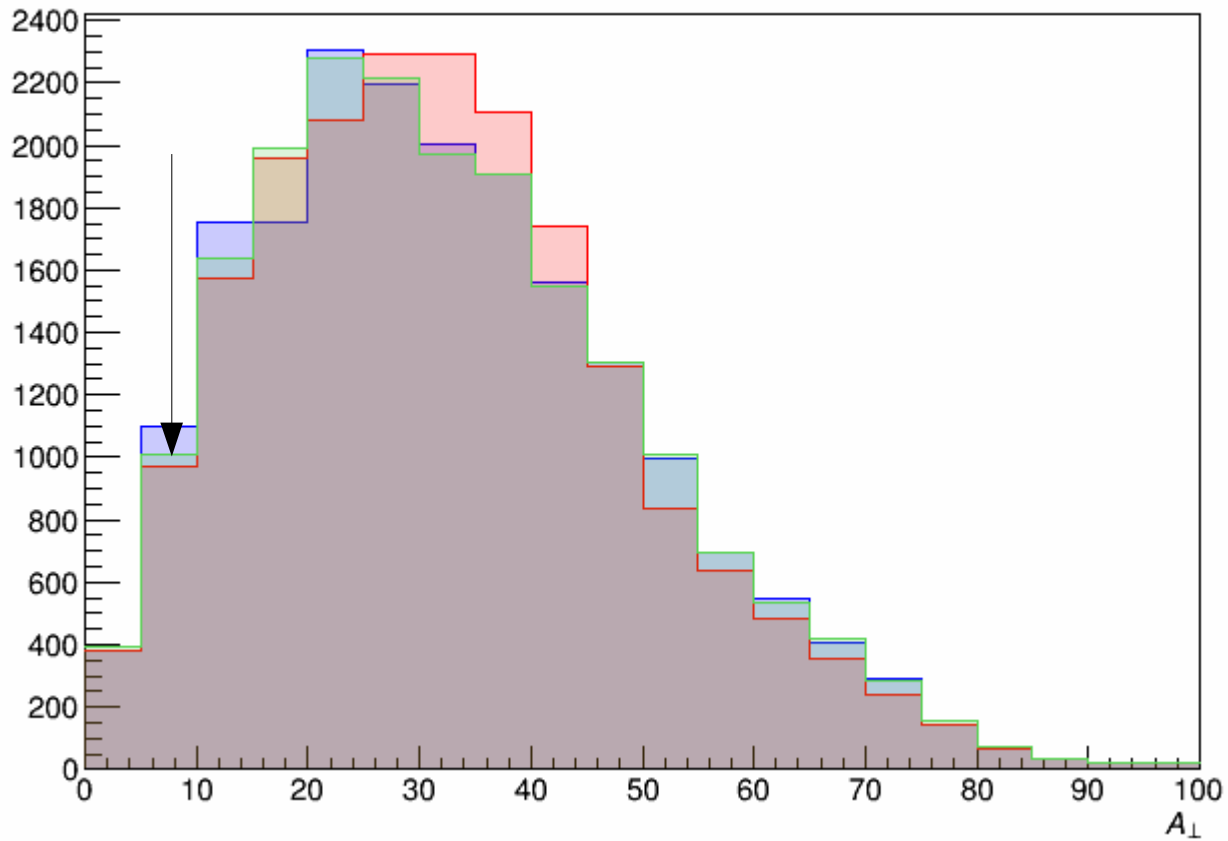
- Paper
- RMS covariances
- Different bin cut



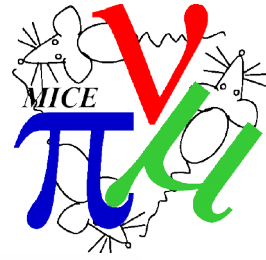
Bin 2



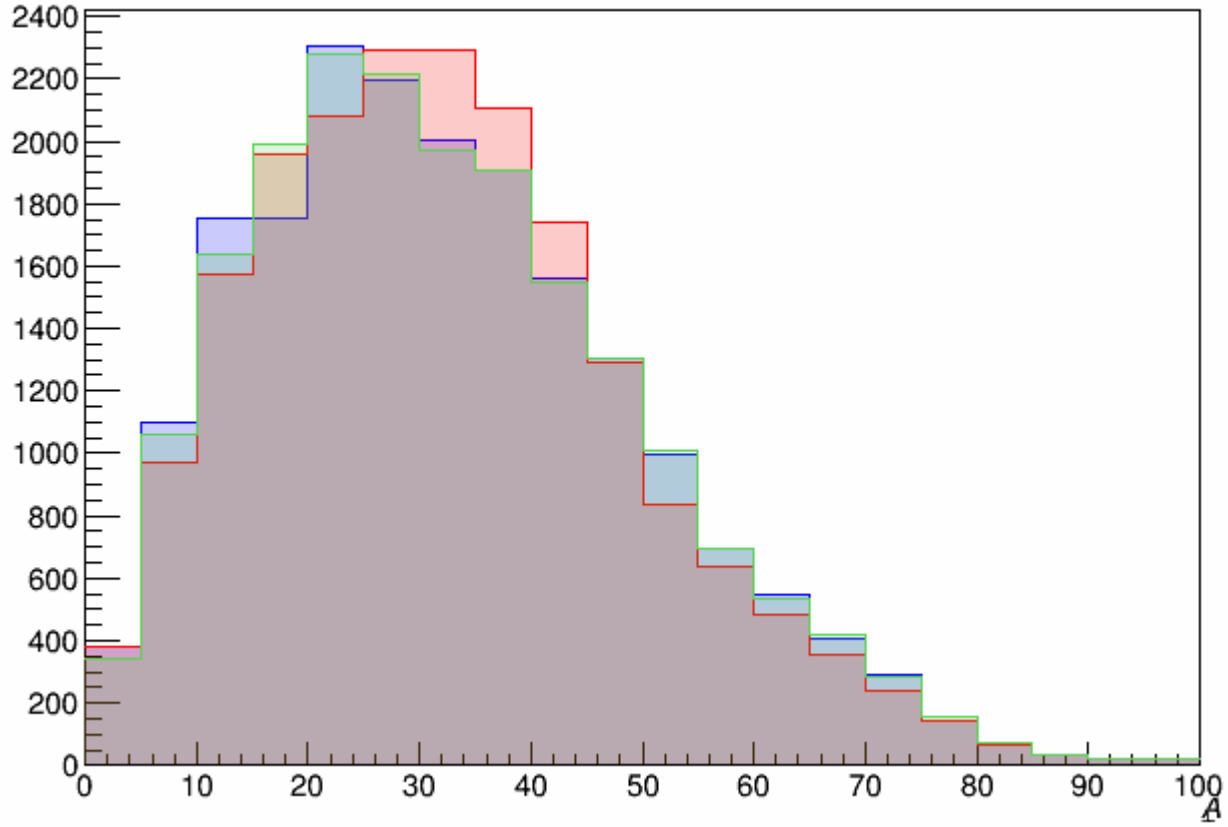
- Paper
- RMS covariances
- Different bin cut



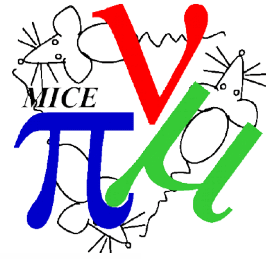
No cut



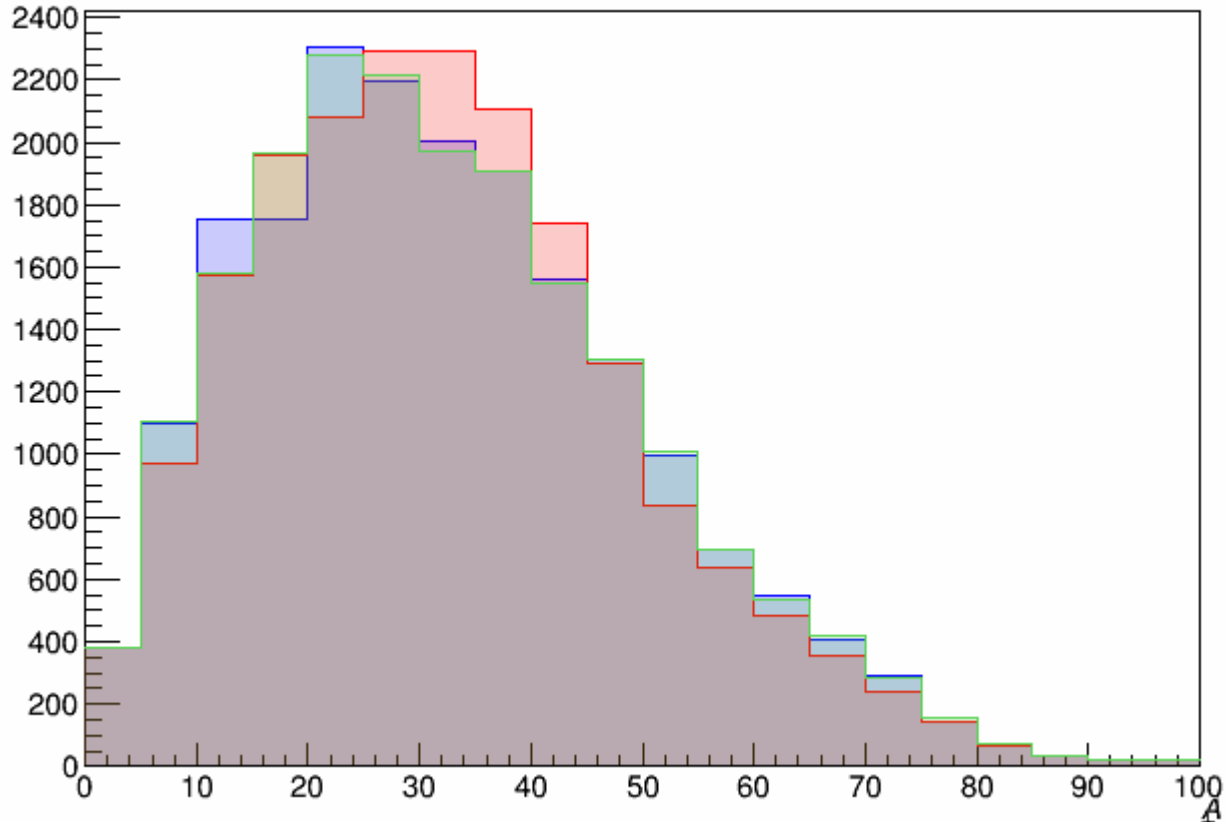
- Paper
- RMS covariances
- Different bin cut



Min events = 2000



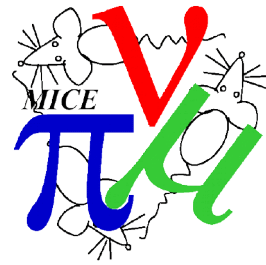
- Paper
- RMS covariances
- Min events cut



- Rather than doing something bin-based, I just stop updating V once the number of events in a subsample is fewer than 2000



Further thought



- Statistics will go up when we go to production reconstruction
- So stats issue likely not big deal when I do the final analysis