Multiple ring detection

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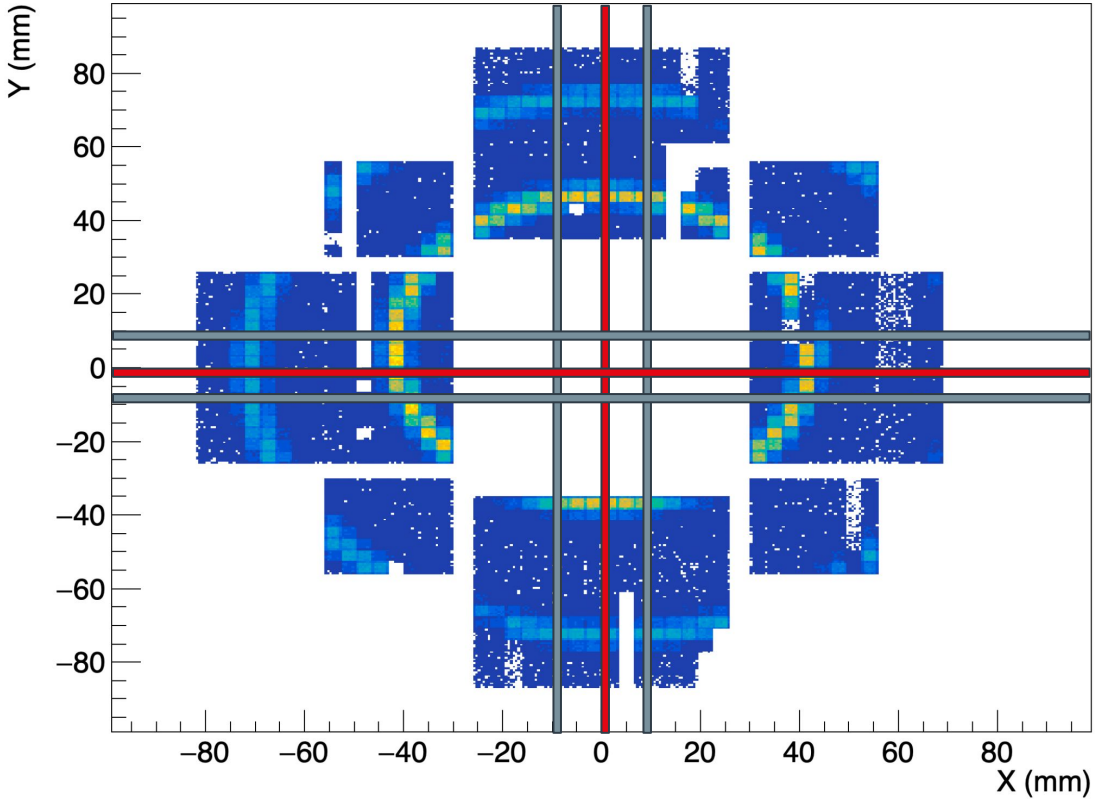
Multiple ring detection: X_0 and Y_0

We start by taking thin slices in both X and Y. If we look at the example here, suppose to analyse the red regions first



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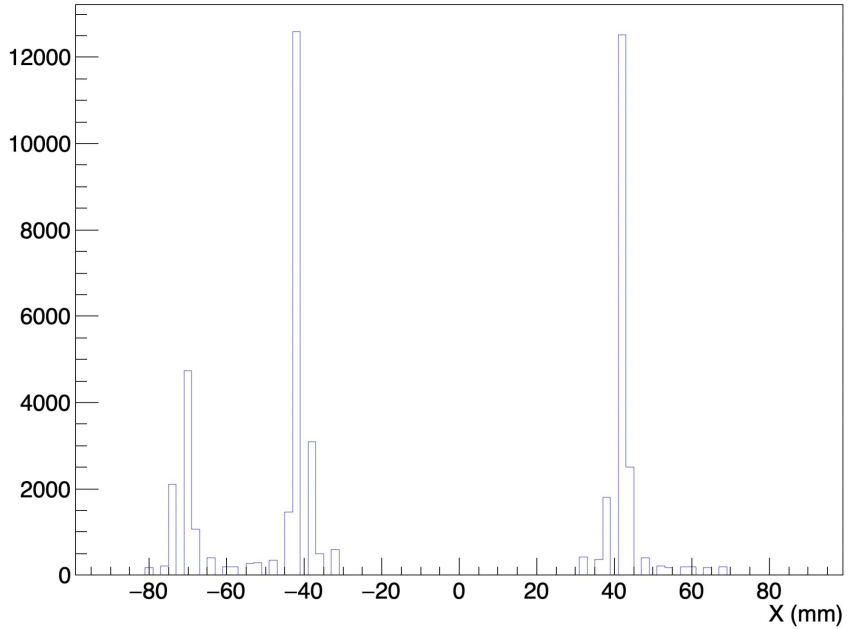
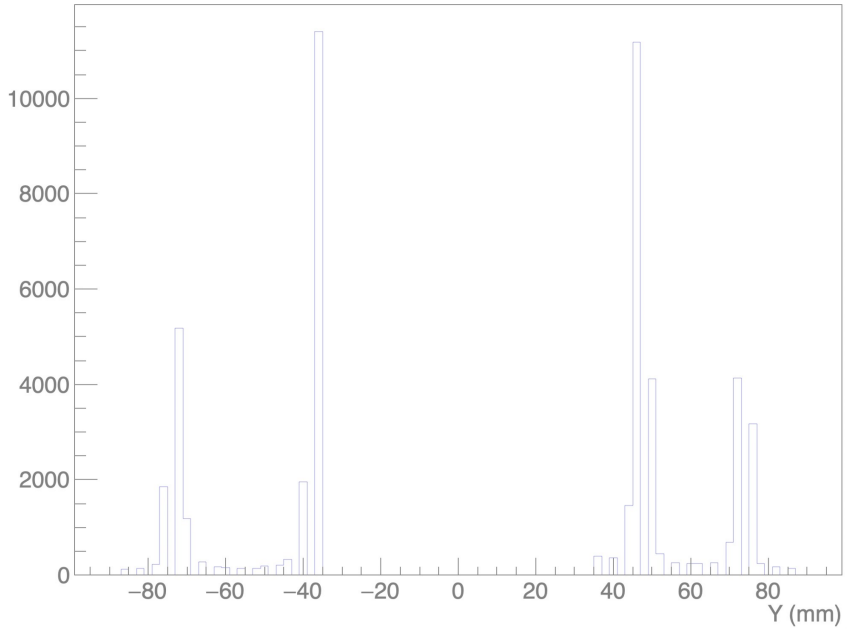
Multiple ring detection: X_0 and Y_0

We can obtain something similar to what was used by Rohit





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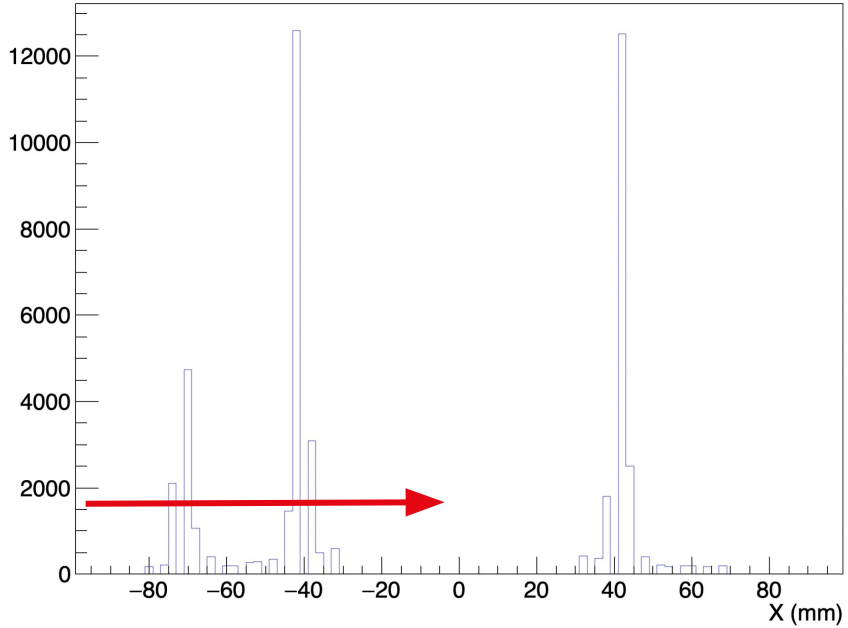
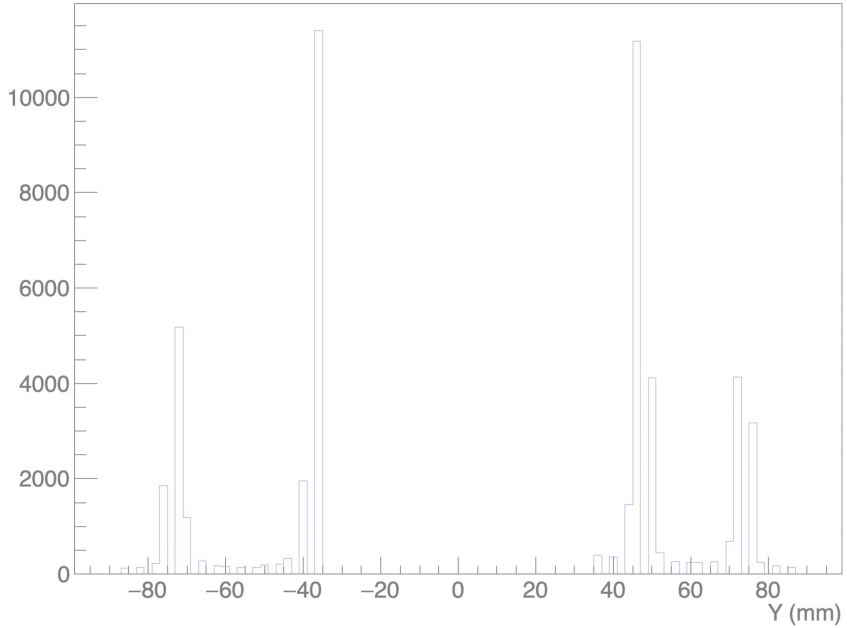
Multiple ring detection: X_0 and Y_0

We now go from left to right and look for local peaks. Everytime we find on we store its position. Supposing the coordinate center is always within the smaller ring...





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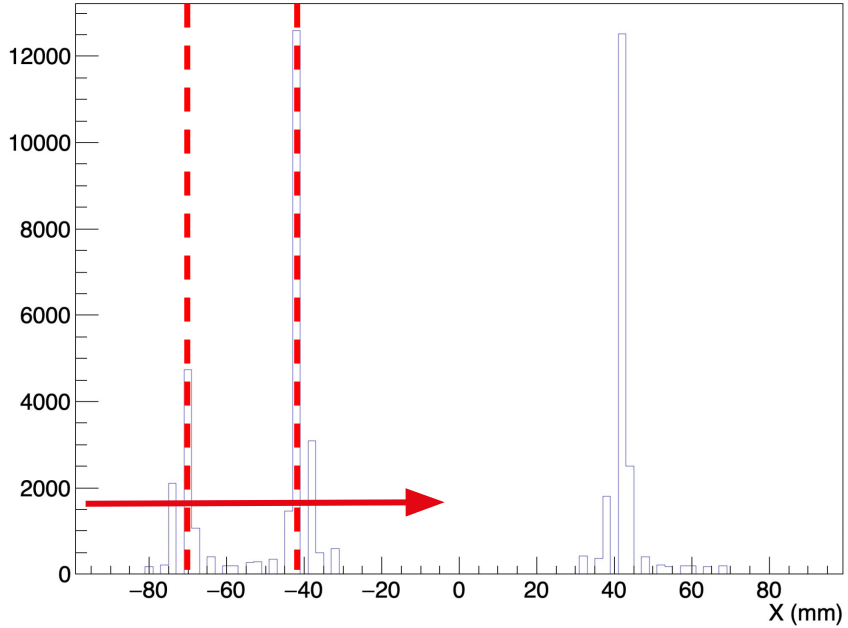
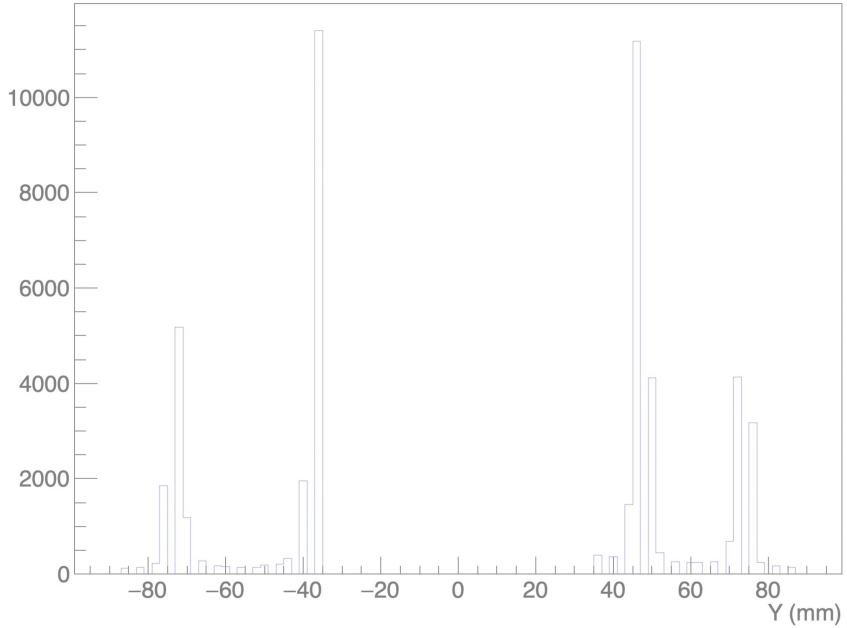
Multiple ring detection: X_0 and Y_0

... the number of peaks will give us the number of rings! We still need to adjust for acceptance (i.e. if we go right to left, for example, we only see one peak)*





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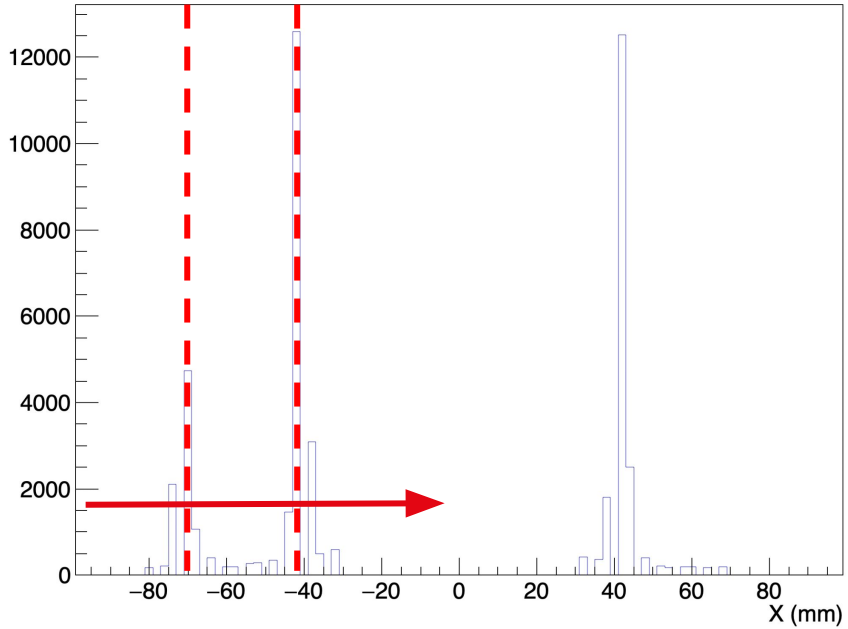
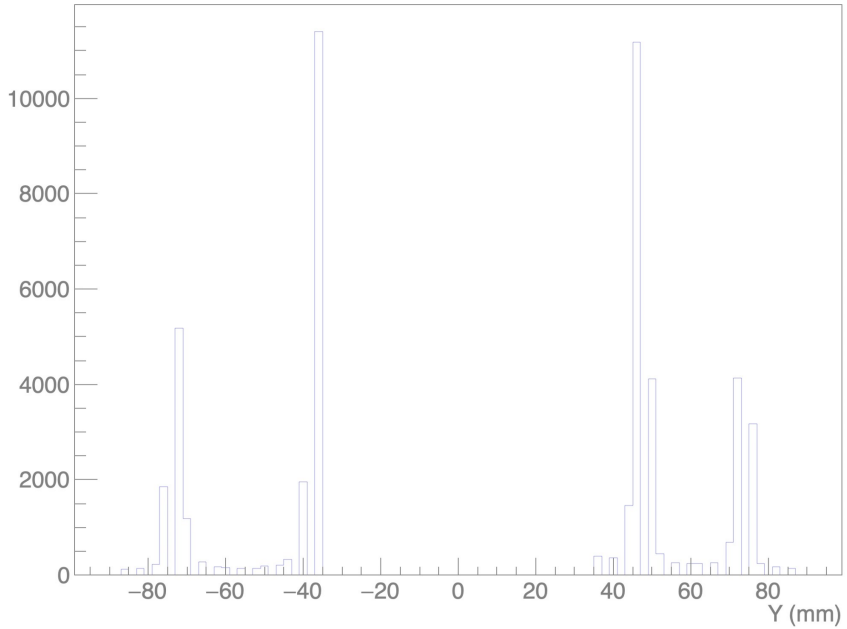
Multiple ring detection: X_0 and Y_0

* we can adjust by taking the maximum number of peaks identified in a semi-axis both in X and Y





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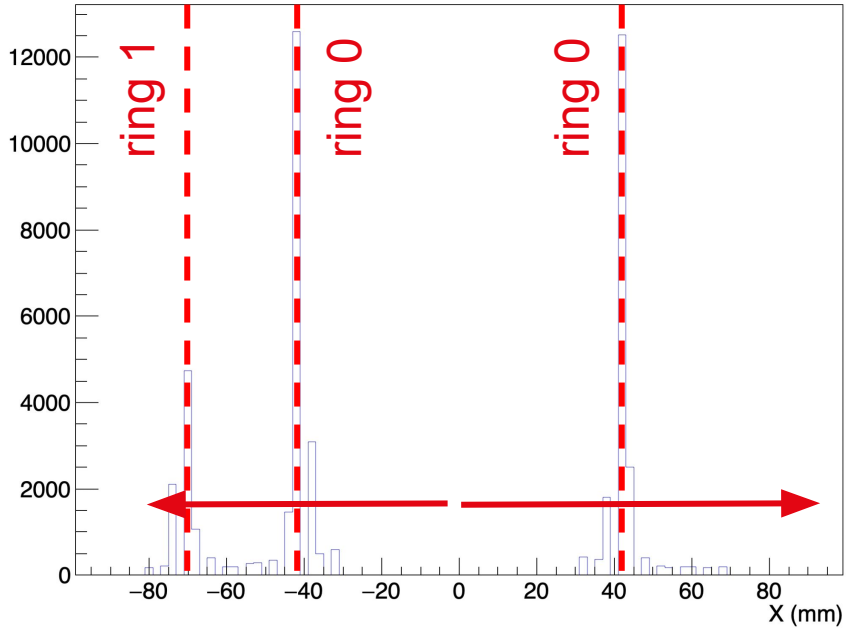
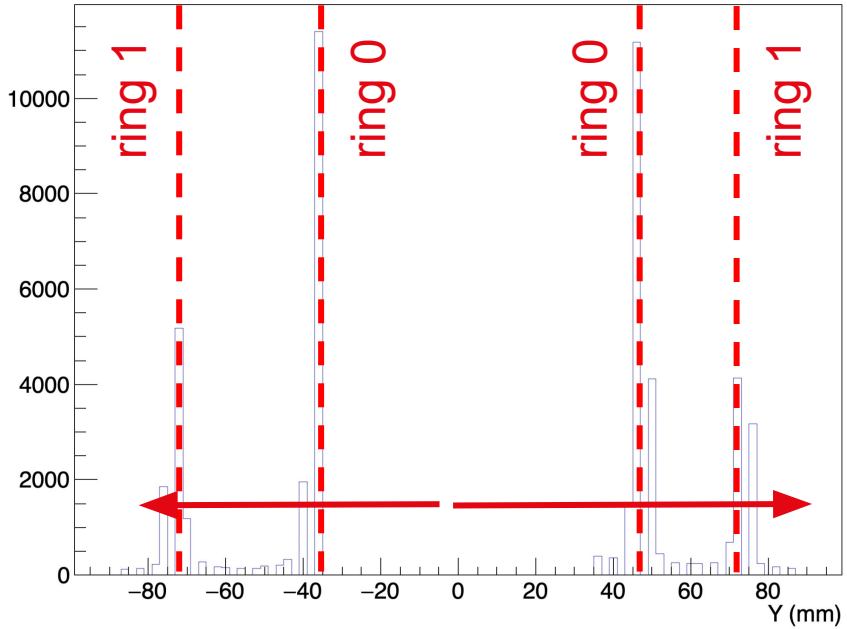
Multiple ring detection: X_0 and Y_0

We can now assign the peaks to a given ring, from center out.





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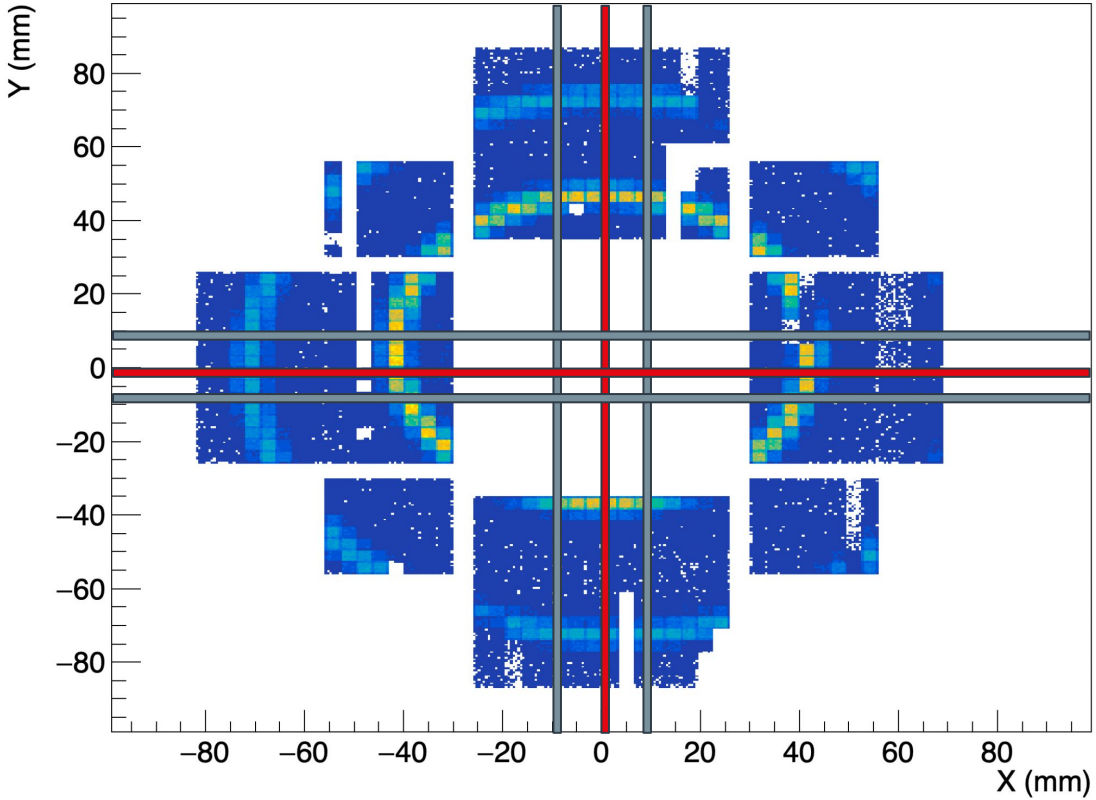
Multiple ring detection: X_0 and Y_0

And each point is, in reality, a 2D point. The center of the slice region gives the second coordinate. We can then fit these points to have a rough guess of where the circle actually is...



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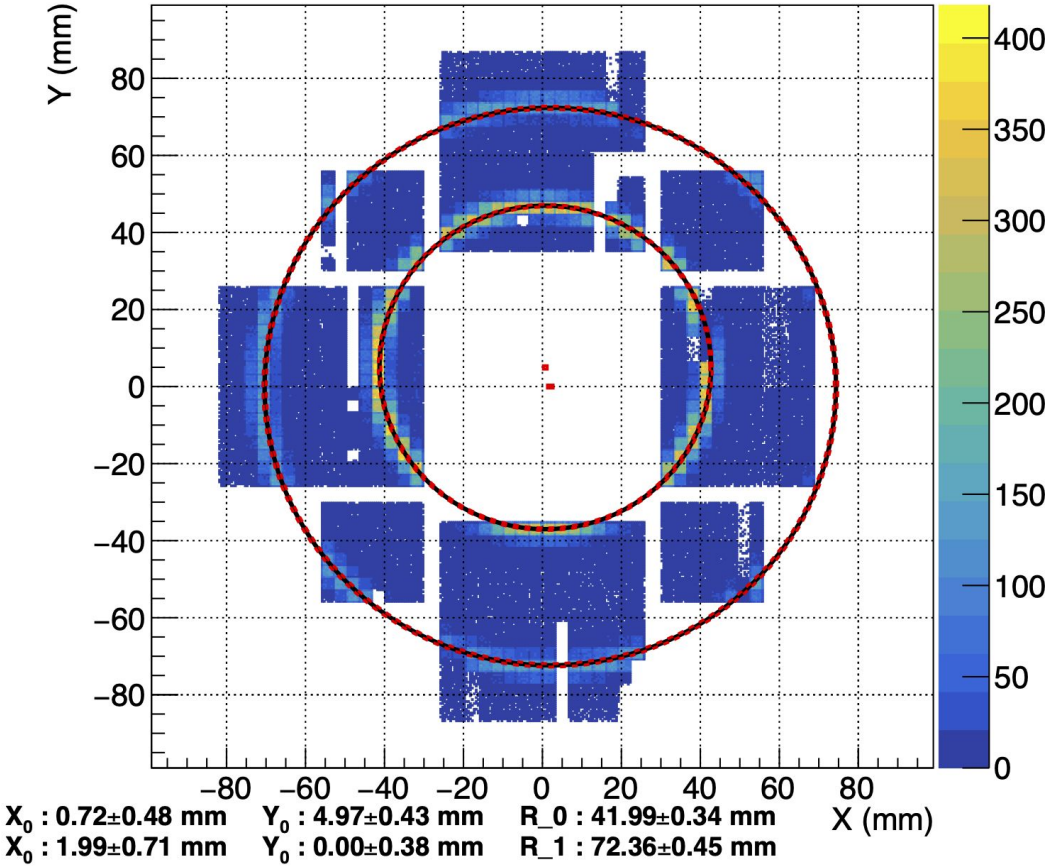
Multiple ring detection

This is already the result with a few points (maximum 12 per circle, most likely 8-9).
The prediction looks very good, the only issue is the centers are quite different. We can then make a fit that constrains the center to be in common...



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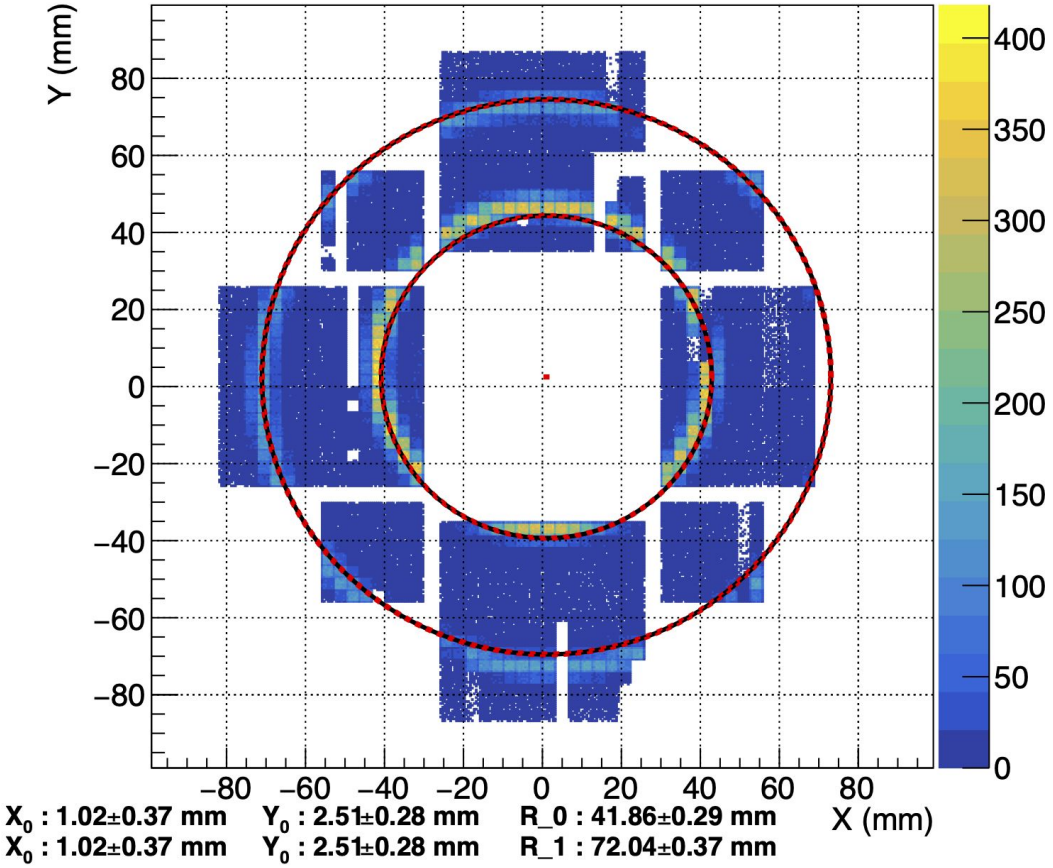
Multiple ring detection

Quite strangely this means a worsening of the quality of the fit. This can also be seen in the distribution of R (similarly to what was proposed by Arvind)



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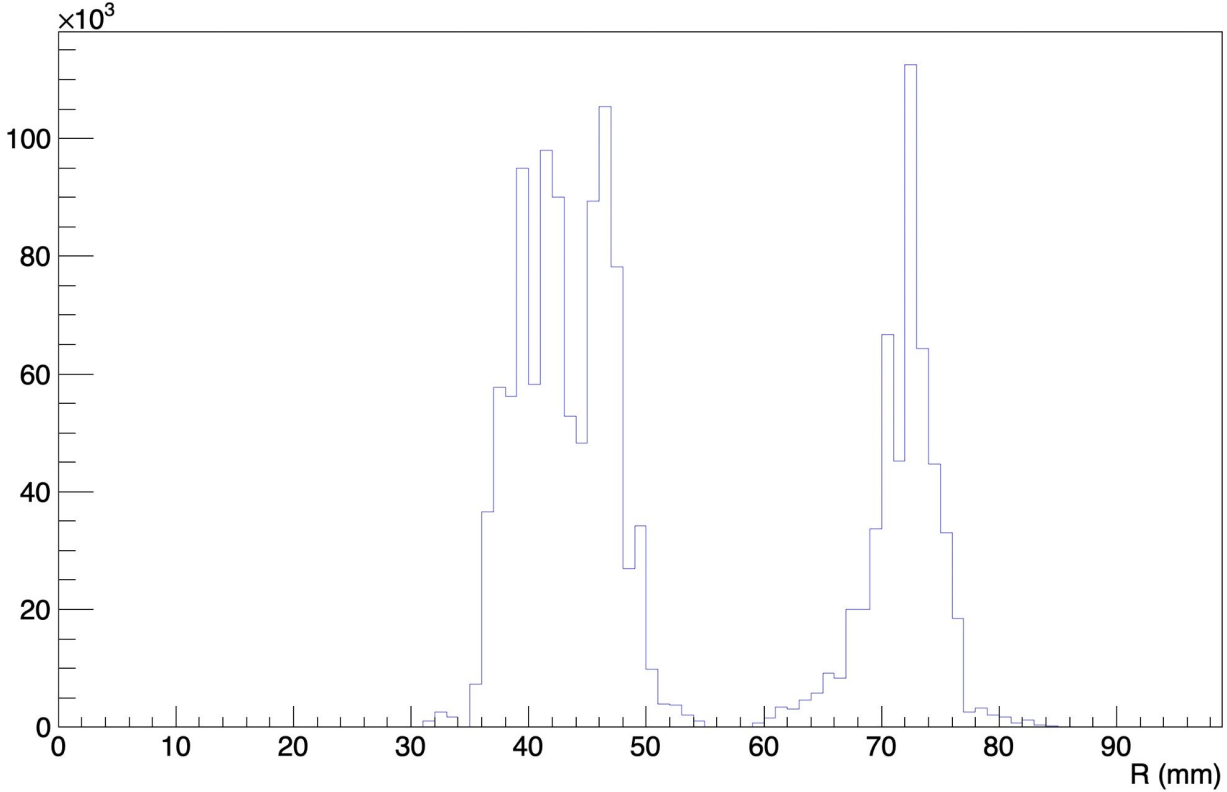
Multiple ring detection: R distribution



No shift in center

- Multiple peaks
- broad distribution
- hard to measure resolution

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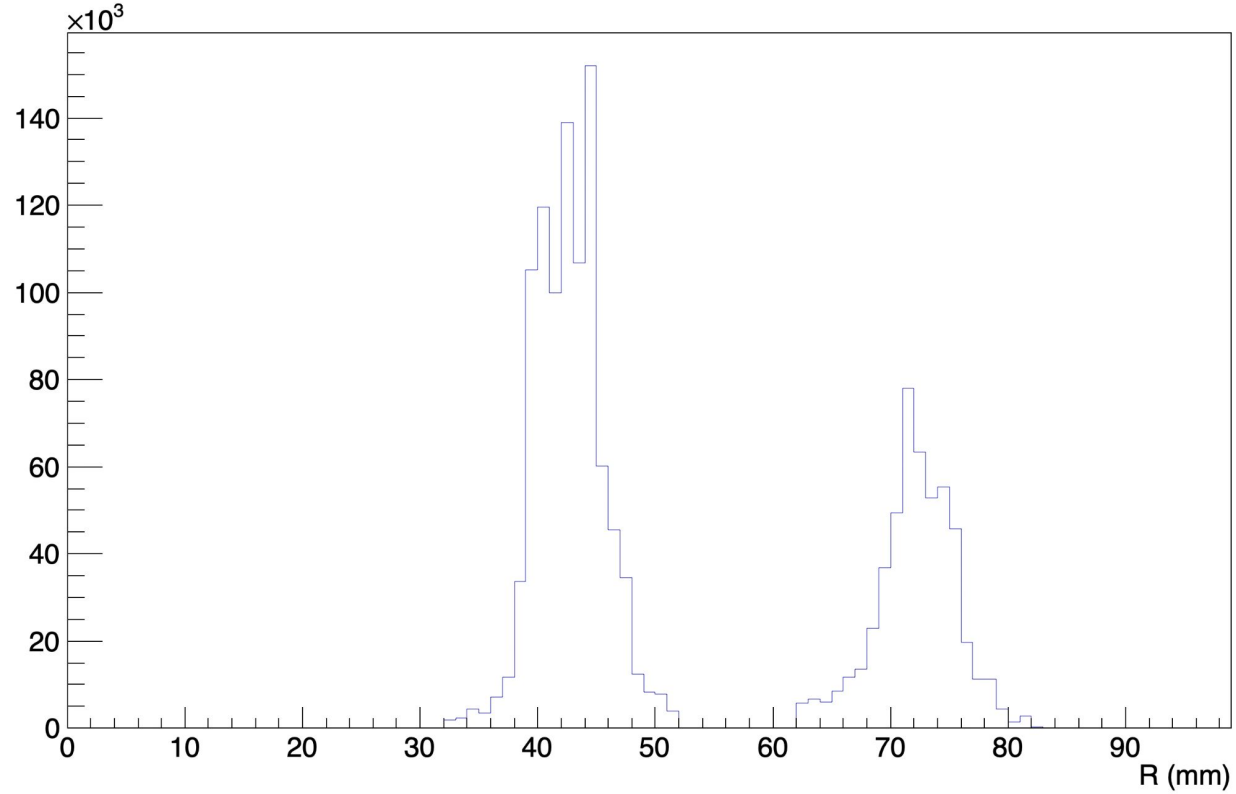
Multiple ring detection: R distribution



Center shifted in common center

- Less peaks
- smaller distribution
- able to measure resolution

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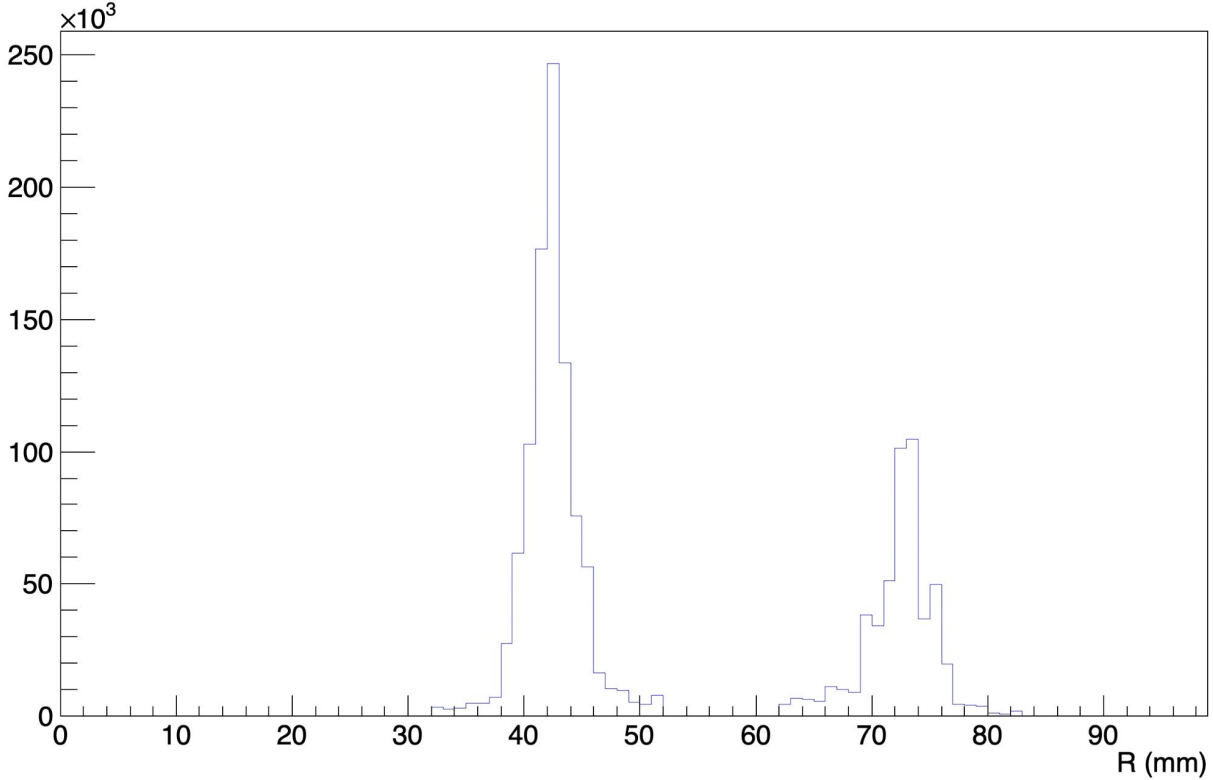
Multiple ring detection: R distribution



Center shifted independently to ring center

- Two clear peaks
- gaussian distribution
- clear measure of resolution
- probably not perfect for the aerogel ring (R~75)

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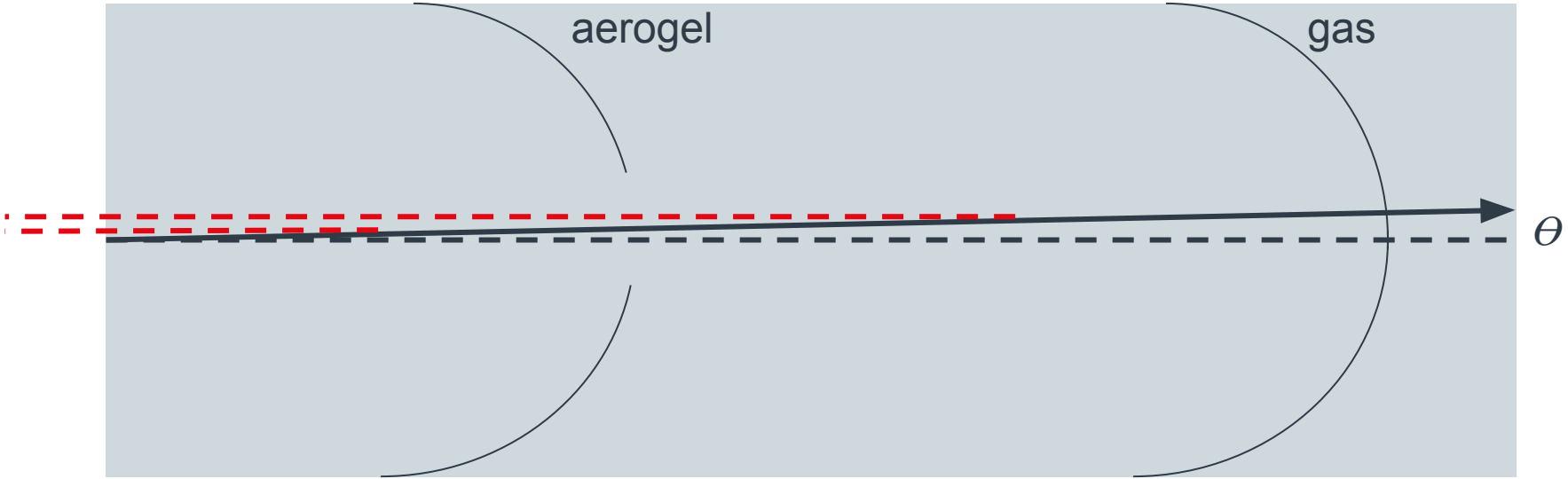
Multiple center anomaly: guesses



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Thank you!

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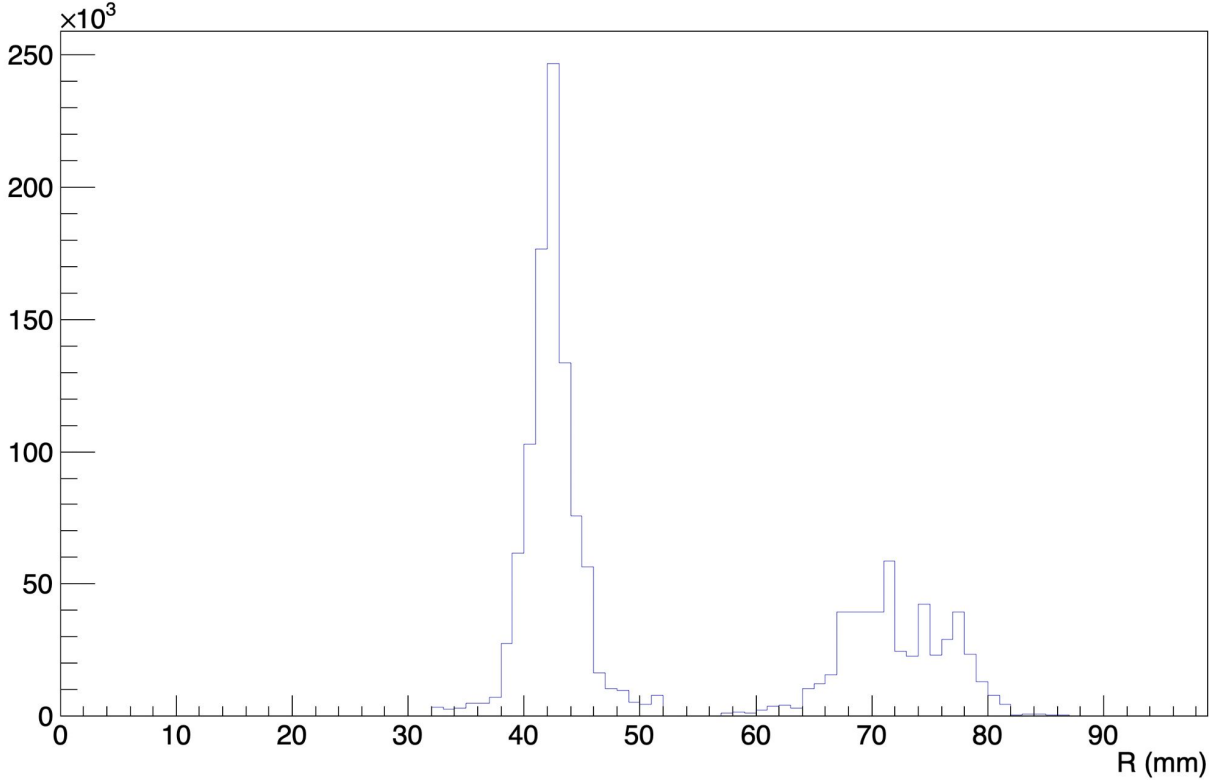
Back-up slides

Multiple ring detection: R distribution



Center shifted for both to gas ring center

- one clear peaks, aerogel clearly wrong
- gaussian distribution of only gas
- not right for the aerogel ring (R~75)

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