

# GATE Simulation study

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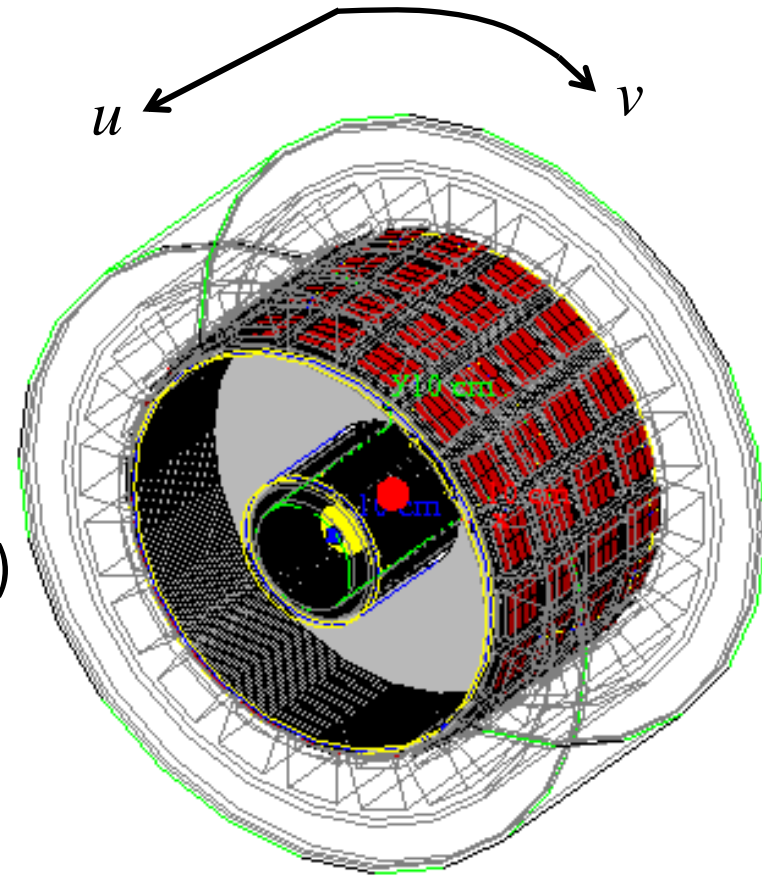
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- GATE simulation
  - peak search study

# XEMIS2 Geometry

- radial  $7 < r < 19$  cm
- axial (z) Length =  $2 \times 12$  cm  
(divided by cathode)
- Electric Field in z direction 2 kV/cm
- Pad size :  $3.175 \times 3.175$  mm<sup>2</sup>
- Source <sup>44</sup>Sc ( $\beta^+$ ,  $\gamma$  : 1.157 MeV)
- Source position  
(cylinder :  $0 < r < 2.5$  cm  $-7.5 < z < 7.5$  cm)
- Drift velocity : 3 mm/usec
- PMTs
  - 2inch :  $4 \times 20$   
( $4.624 \times 4.624$  cm<sup>2</sup>)  
(divide PhotoCathode by  $2(v)$  and  $4(u)$ )



# GATE simulation

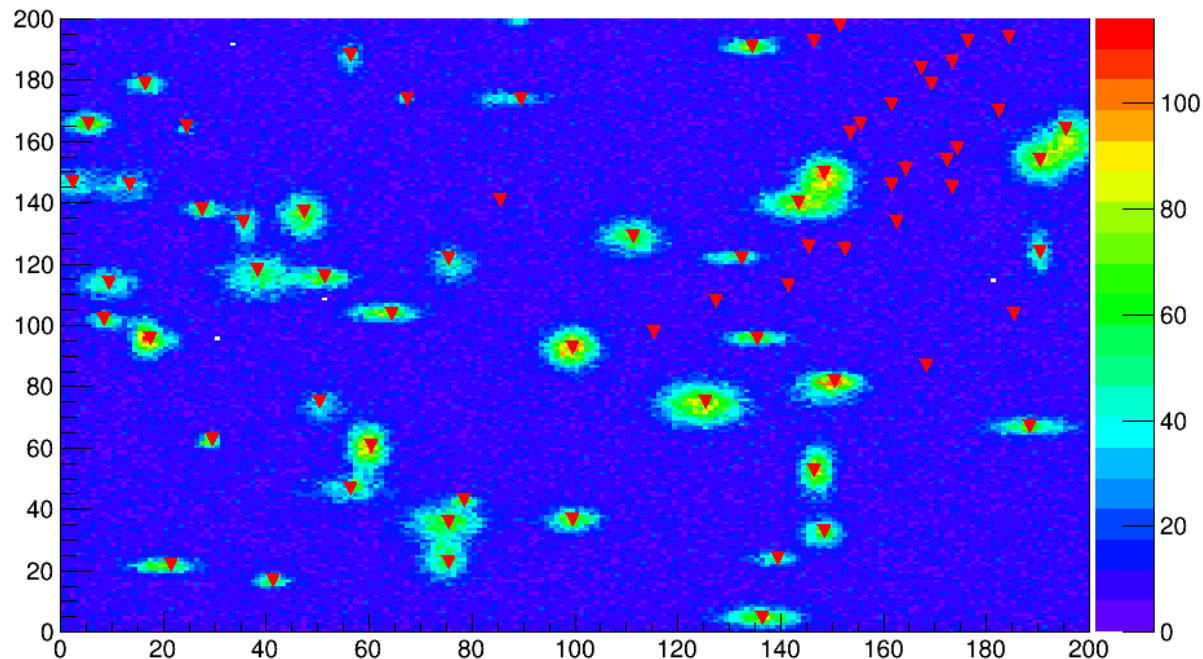
# Peak search

- Used TSpectrum and TSpectrum2 of ROOT function
  - These find the peaks based on histogram data.  
(TSpectrum : for 1D histogram  
TSpectrum2 : for 2D histogram)
  - We can get the position information of the peaks from TSpectrum function.
  - Graph of next page is the example program of TSpectrum2.

# Peak search

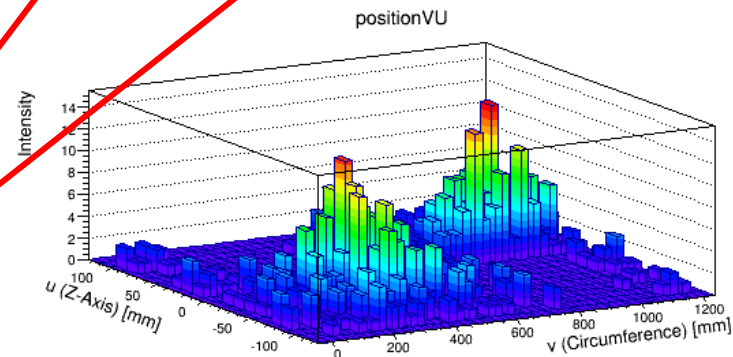
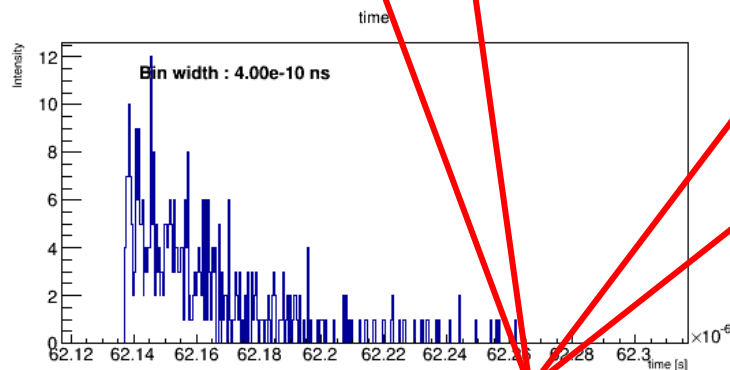
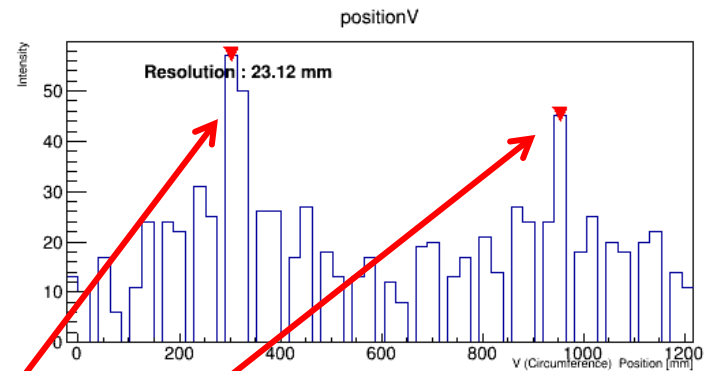
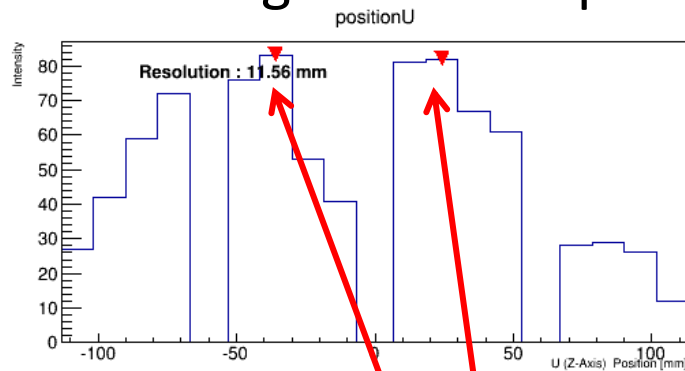
- Example of TSpectrum2 (peaks2.C)
  - These peaks were generated at random and convoluted with gauss function
  - Red triangle shows the peak points

test



# Peak search

- Test for the histograms for the photon distribution
  - Red triangles are the peaks



- Two peaks were found (by using 1D histogram), but TSpectrum2 (2D histogram) function were not able to find the peak.

# Conclusion

- Got the peaks of 1D position histogram by TSpectrum of ROOT function
- Could not find the peak of 2D histogram
- For this problem, I will study TSpectrum and TSpectrum2 more detail through ROOT reference as next step.....



# Next



- Study algorithm of peak search
  - ROOT references
- Study the fitting