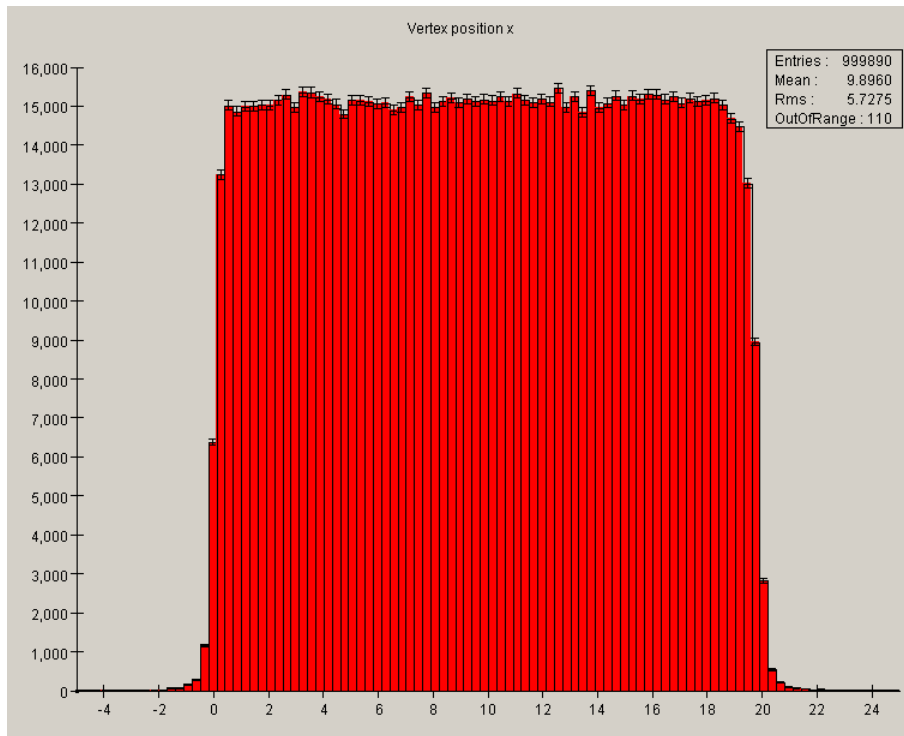


# Vertex Fitting

- ◆ A vertex fitting package was written to find the reconstructed decay point of a heavy photon
  - Decays are assumed to occur in the “B=0” region between the target and the start of the magnetic field
- ◆ First step is to handle B=0 boundary
  - Find location and track direction at  $x = x_{\text{ref}}$  magnetic field boundary
  - Represent tracks in the field free region in terms of  $y_0, z_0, dy/dx, dz/dx$
  - Calculate covariance matrix for each StraightLineTrack from the corresponding helix covariance matrix (correlations are important)
- ◆ VertexFitter fits  $\geq 2$  StraightLineTracks to a common vertex
  - For 2 tracks, four constraints (2 tracks times x-y and x-z views)
  - Vertex position provides 3 unknowns to be solved for
  - 1C fit – adapt old SQUAW kinematic fitting algorithm to find best fit for the vertex position

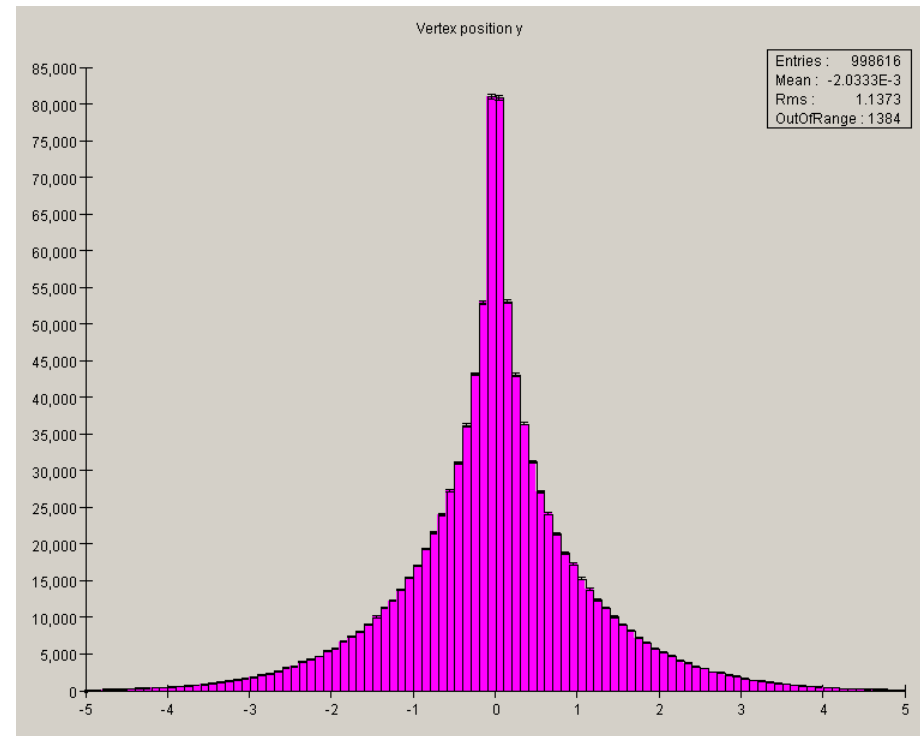
# Toy Model

- ◆ Created a simple test model to get code working
  - Simulated 2 body kinematics
  - Created helices starting at magnetic field boundary
  - Smeared helix parameters (diagonal covariance matrix for helix)
  - Ran new code to turn helices into StraightLineTracks, fit vertex position



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$V_x$



$V_y$

2

# Vertex Fit Results

