

“Improvement” of Vertex Prediction Method

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Goal & Method

- **Goal** : Obtain new vertex predictions for the 80 events with good quality m-files.
- **Method** : Use the χ^2 minimization technique we have already discussed. Main steps :
 - Use “manual” vertex prediction as a starting point
 - Perform MC Search in order to find the uz, vz points with the greater number 2D SF lines.
 - Use these points to create 3D SF tracks and perform the minimization.

Changes

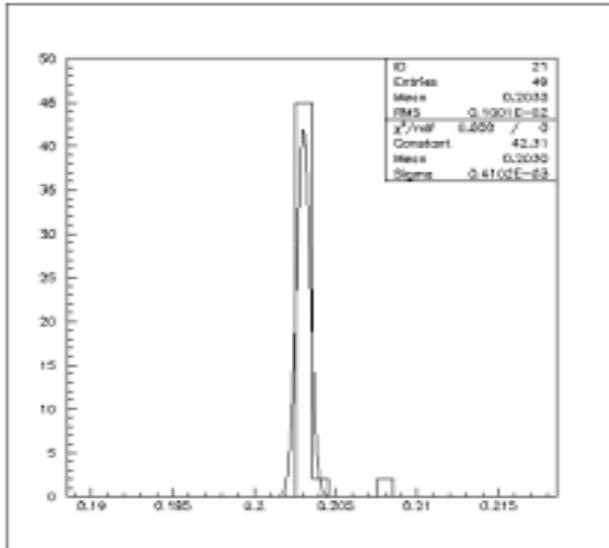
- In the second step of the minimization procedure, **slightly different results** might be obtained due to the **MC search method** used.
- These changes **affect** the **final results** since different starting points are used to create 3D SF tracks.
- In addition, most of the **80 events** with good quality m-files are events with **large showers** that makes the procedure of finding the points with the **greater number of 2D** lines even **more sensitive**.
- Therefore, in order to **check** the **stability** of the **results**, we decided to **repeat** the **minimization** procedure **many times** for **each event** and **examine** our results **using** already **Located** Events .

Procedure

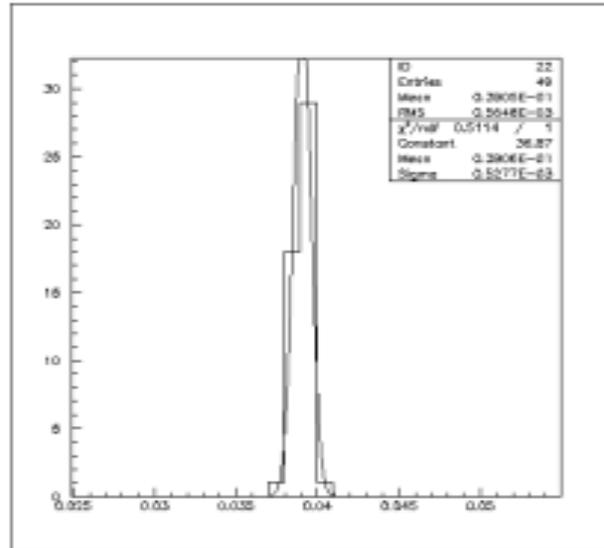
- Use 100 already located events and :
 - **Repeat** the **minimization** procedure **50 times** for each event.
 - Plot the 50 u , v , z , predictions of the vertex and **fit** the **distributions** obtaining the **Mean value** and the **Error**.
 - Use the **mean value** and its **error** (with a multiplication factor) as the **Final Prediction**.
 - **Check** the **residuals in u , v and z** of the predicted from the located vertex .

Example

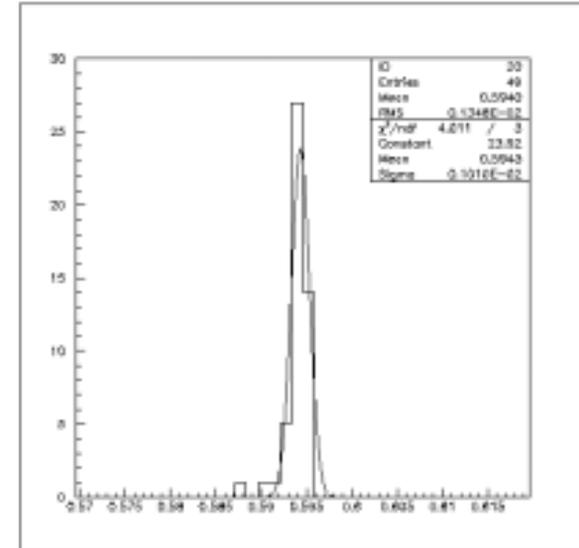
U



V



Z



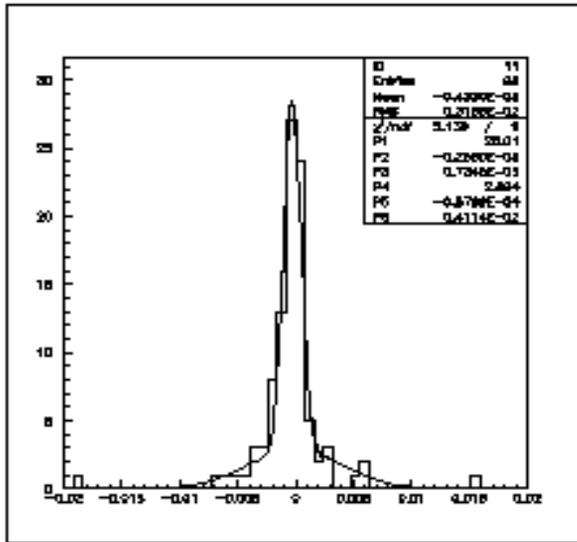
U : Mean = 0.2030 Error = 0.41 mm

V : Mean = 0.0391 Error = 0.53 mm

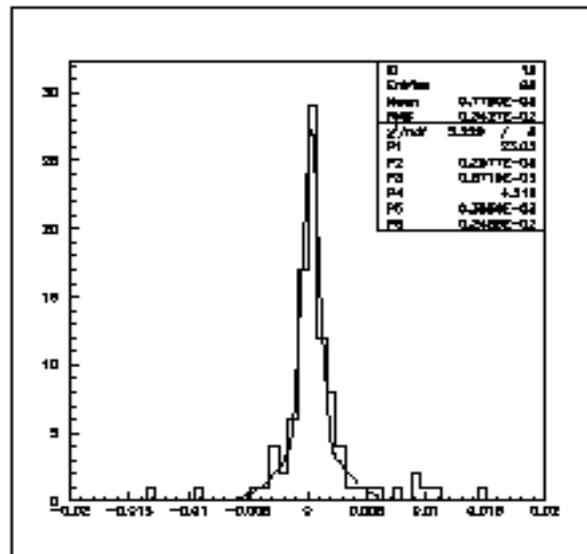
Z : Mean = 0.5943 Error = 1.01 mm

Results

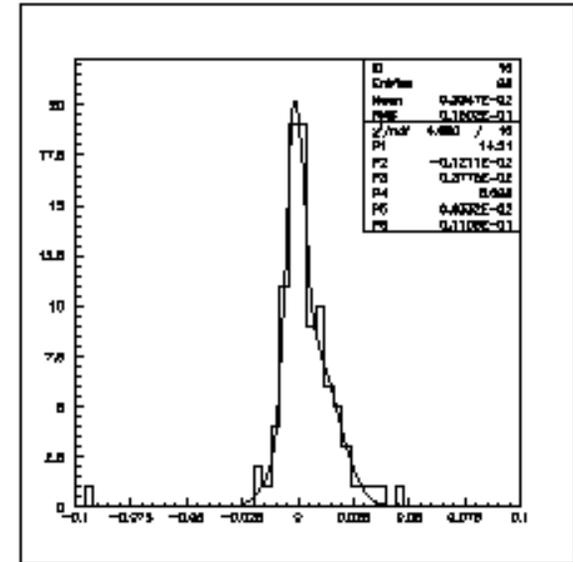
ΔU



ΔV



ΔZ



NEW(100 events)

U & V : ~ 15 % 3 mm sigma & 85% 0.7 mm sigma

Z : ~ 35 % 10 mm sigma & 65 % 3.7 mm sigma

OLD (200 events)

U & V : ~ 13 % 3 mm sigma & 87% 0.65 mm sigma

Z : ~ 25 % 9.4 mm sigma & 75 % 3.1 mm sigma

Summary

- The results obtained using this variation of the minimization method and the initial one, are very similar.
- Thus :
 - The slight difference of the MC search results does not affect the final results.
 - We can consider this method at least as safe as the initial one and therefore use it.
 - The new method can be considered as more safe as far as “showering” events are concerned.
- **The processing of the 80 good quality events is finished and within the next couple of days we will be ready to send our predictions .**