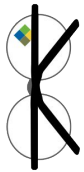

SpecTk 2D Fitting

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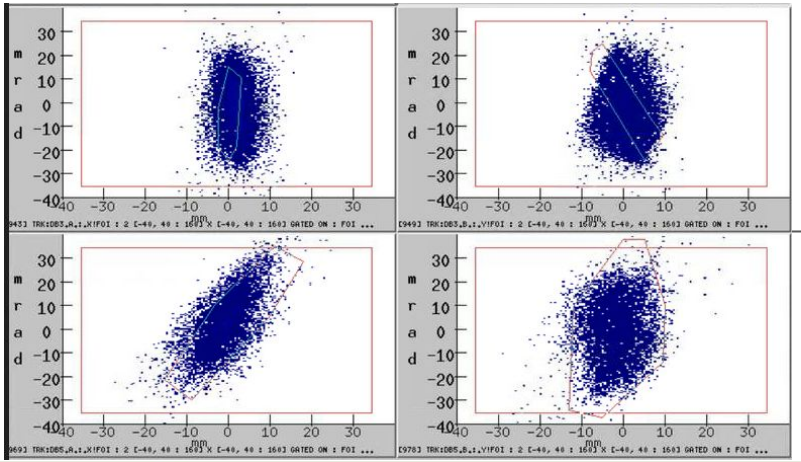
Introduction

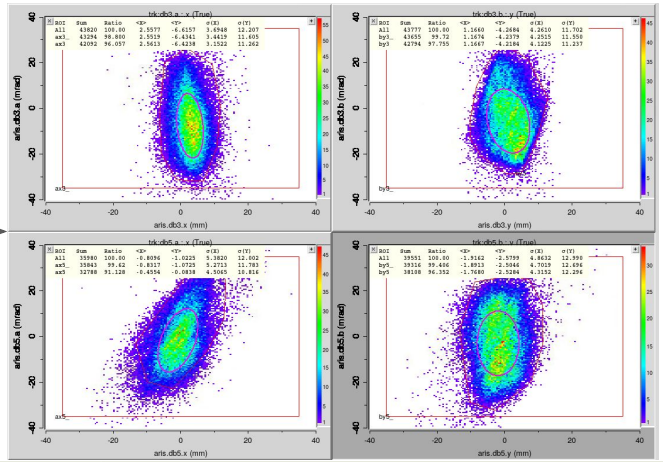
Intro

- SpecTk offers numerous advantages over Xamine for data analysis and statistical visualization.
- In the below example we can see a the SpecTk statistics display
  - SpecTk also has an advanced display which includes covariance, slope, and area of the ROI
- We also see the contour of an Elliptical end cap fit one of three 2D methods SpecTk offers

Xamine



SpecTk



Results

- Below are some elliptical fits for run 3582
- The equation used can be found here

db3 a.x

Ellipse initialization complete
Normalized Chi2 = 30.579

Area	= 159.44
x0	= 2.7244
y0	= -7.1204
a	= 22.469
b	= 5.7153
c	= 33.379
θ	= -1.5079

db3 b.y

Ellipse initialization complete
Normalized Chi2 = 25.186

Area	= 322.5
x0	= 1.0661
y0	= -4.1784
a	= 8.5154
b	= 24.127
c	= 23.411
θ	= 0.082278

db5 a.x

Ellipse initialization complete
Normalized Chi2 = 18.726

Area	= 259.1
x0	= -0.83817
y0	= -1.7094
a	= 22.184
b	= 7.4407
c	= 21.266
θ	= 1.3547

db5 b.y

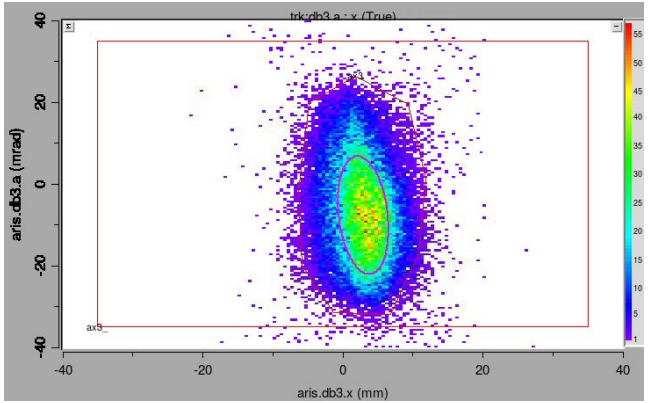
Ellipse initialization complete
Normalized Chi2 = 13.83

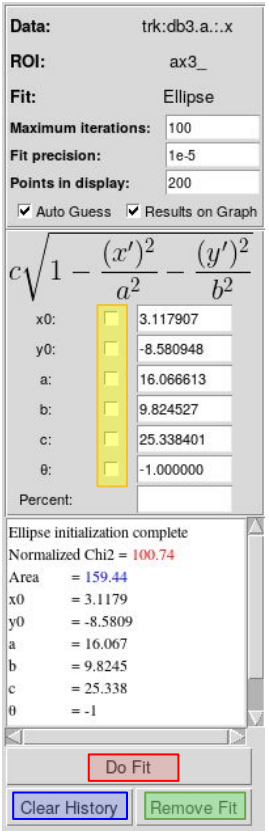
Area	= 357.37
x0	= -1.8723
y0	= -2.747
a	= 8.6986
b	= 26.173
c	= 18.374
θ	= 1.3e-05

How to Fit

How to

- Create a ROI around the data you want to apply a fit to
- Go to the fitting drawer tab
- Select the fit you want (2D Guassian, Polynomial, Ellipse)
- Press the fit button (Red)
- Clear History (Blue) removes the text with the parameters
- Remove fit (Green) removes the contour visualizing the fit
- To fix parameters check the boxes next to their names (Yellow)





Equations Used

Gaussian

$$Aexp(-[\frac{(x')^2}{2\sigma_x^2}+\frac{(y')^2}{2\sigma_y^2}])+Z$$

$$x' = (x-x0)cos\theta + (y-y0)sin\theta$$
$$y' = -(x-x0)sin\theta + (y-y0)cos\theta$$

Polynomial

$$Ax^2+Bxy+Cy^2+Dx+Ey+F$$

Elliptical

$$c\sqrt{1-\frac{(x')^2}{a^2}-\frac{(y')^2}{b^2}}$$

$$y' = -(x-x_0)sin(\theta)+(y-y_0)cos(\theta)$$

$$x' = (x-x_0)cos(\theta)+(y-y_0)sin(\theta)$$

Troubleshooting

Bad Fit

- Sometimes you get a bad fit due to bad auto guess parameters
  - Check off auto guess (Red)
  - Do Fit again
  - In the example you can see Chi Squared is greatly improved
- The fitting program sometimes gets stuck in a local minimum
  - You can turn off auto guess and change the value
  - You can also add a fixed value like for x0 and y0 which can be calculated