Photon beam profiler software problems during primEx-II

(Liping Gan, Dec 17, 2010)

I just discovered two software problems for the photon beam profiler GUI used during primEx-II run. Both problems are associated to the fitting value of the beam position online. The first problem is that the software gain factors for each fiber were not updated with the new parameters which I obtained by using cosmic ray calibration in Sept 2010, and the old parameters from PrimEx-I were used instead. The second problem is in the fitting program, there was a offset for fitted y position of the beam which should not be there (see $mean_y = $mean_y - 8.41 in the code). The sign of fitted x position was reversed (see $mean_x = -1.0*$mean_x in the code). As a result, all fitted values recorded online are not correct. We should use the raw data to get correct beam positions.

The following are the procedure to get the beam position from raw data:

(1) There are two epics variables, pgp_x.VAL(64) and pgp_y.VAL(64), in the data stream. They are both 64 elements arrays of raw data which are corresponding to 64 channels of fibers in both x and y planes. The values of these variables are the counts per second for each fiber channel.

(2) In order to equalize the gain for each channel, one needs multiply raw data with the gain parameters for each channel which are provided in the attached files (x_gain-primexII.dat and y_gain-primexII.dat) :

counts_x= pgp_x.VAL*x_gain;

counts_y= pgp_y.VAL*y_gain

(3) Convert the channel # into x and y positions (in mm) as following:

x = (channel# -30)*2;

y=(channel#-31)*2

(4) Plot the counts_x vs. x position to get the beam profile in x direction and plot the counts_y vs. y position to get the beam profile in the y direction.

(5) Fit both x and y beam profiles to get the positions of the beam center.

(6) Translate the x and y positions obtained above into the Hall B coordinate.

*** gain factors for x fiber from chan#1 to #64

1.027660

0.9937350

0.9826066

1.087266

0.9469575

0.7730084

0.8435263

0.8248000

0.9225951

0.8254604

0.9279928

0.8573804

0.8449088

0.8936078

0.8990626

1.280745

1.449561

0.9963759

1.106223

1.479727

1.206201

0.7910992

0.8887931

0.9975811

1.291171

0.9946937

1.253115

1.166290

1.283935

1.184717

1.139227

1.688780

0.9717248

1.053115

1.063161

1.056082

0.8857388

0.7685426

0.7797315

0.7705531

0.8476875

0.8012434

0.7918587

0.8859291

0.9990310

0.8024908

0.8506601

0.8148587

1.013766

0.8986707

0.9156306

0.9434912

0.8988666

0.7859730

0.8286116

0.8534768

0.9127933

0.6362234

0.7838814

0.9236282

0.7537927

0

0

0

v*** gain factors for y fiber from chan#1 to #64

0

1.146511

1.150670

1.131103

1.052847

0.9522051

1.073958

0.8694919

1.296855

0.9615295

0.8017107

0.8678451

1.387151

0.7476432

0.8092622

0.7410602

1.495286

0.9708098

1.179971

0.7490011

1.021804

0.9550718

0.9417675

0.9721829

1.040363

0.7941459

0.7477788

1.001700

1.088414

0.7389356

1.437936

1.173591

0.9649041

0.9221824

0.8311165

0.6477148

0.9246637

0.6624900

0.6895168

0.6677461

0.8400896

0.7101774

0.6614274

0.7468309

0.8765144

0.7895845

0.8197178

0.7818009

0.9252861

1.372379

0.7939931

0.7293951

0.9004367

0.7183418

0.7815046

0.5401441

1.137969

0.8828945

0.6457877

0.7203494

0.7744601

0.6255119

0

0