Profile Monitor GUI

Scope

This graphical user interface (Fig. 1) for Matlab enables the collection and analysis of images at various beam profile monitors. The software displays the beam profile and results from image analysis. It can save and load the measurement data.
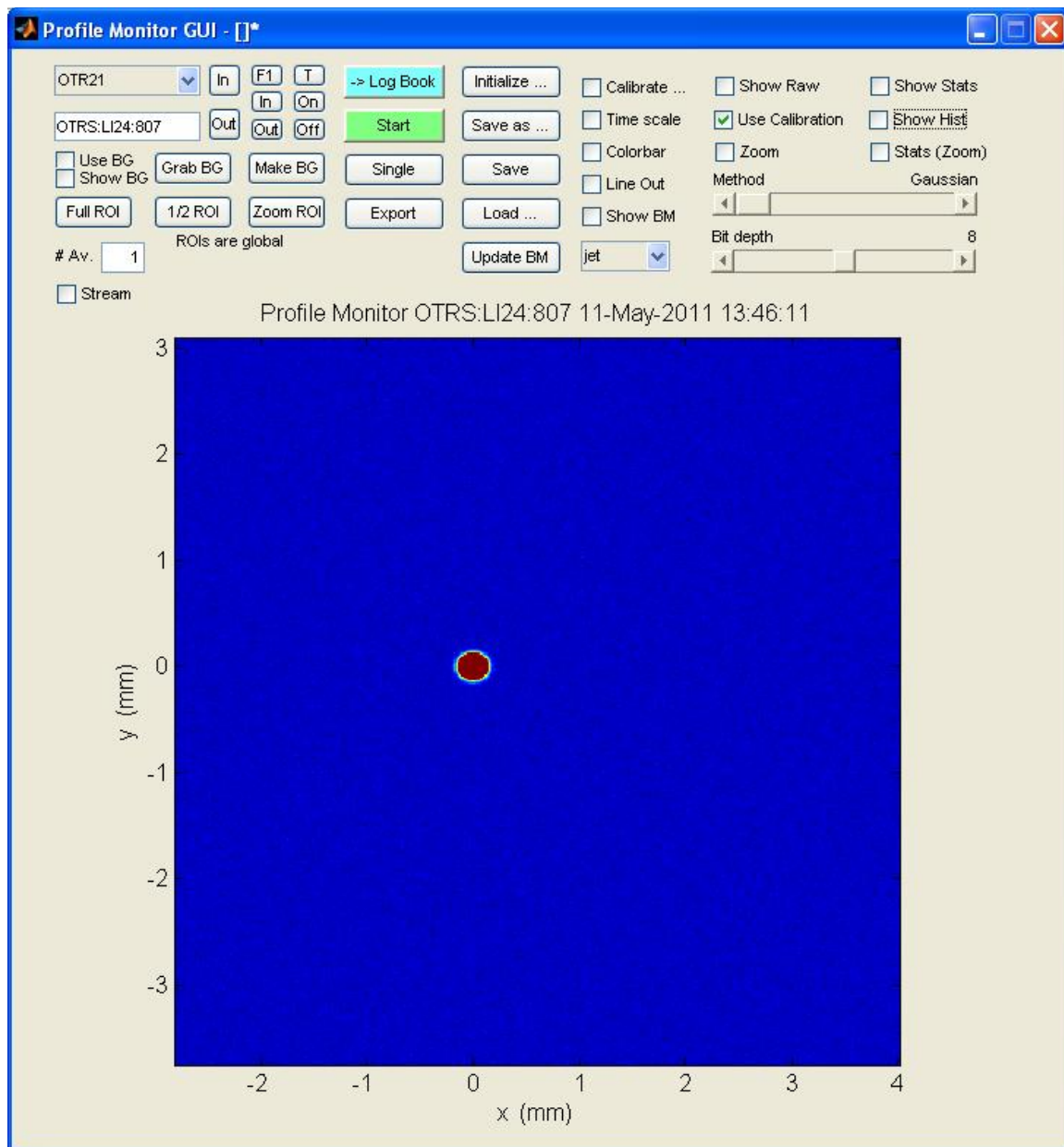

Figure 1: Graphical user interface for profile monitor

Usage Procedure

1. Start program. For LCLS, on the LCLS Home Screen, open User Dev Displays and then select Profile Monitor. For NLCTA, select Profile Monitor from the NLCTA_guiLaunch screen. Alternatively (for either accelerator), type profmon_gui from the command line in a Matlab session.
2. Select desired profile monitor from pulldown menu.
3. Insert/retract screen using In/Out buttons.
4. For cameras having filters, select filter (F1 or F2) and insert/remove using In/Out buttons.
5. For profile monitors having an illumination source, choose the desired lamp -- (T)arget or (G)rid. Turn the lamp On or Off. Selecting T or G a second time allows the intensity to be adjusted Up or Dn.
6. If desired, click Initialize to initialize all profile monitors with their orientation, calibration, and trigger settings.
7. Click Single to obtain a single image or start to collect images continuously (click Stop to stop image collection).
8. To obtain a background scan for subtraction, click Grab BG.
9. To use the obtain background for background subtraction, click the Use BG checkbox.
10. To verify the background image being used, click the Show BG checkbox to display the background image.
11. To make the acquired image the background, click Make BG.
12. To acquire several images and average them to improve SNR, put a number >1 in the Avg. box.
13. To stream images to disk as they are collected, click the Stream checkbox.
14. Change the ROI using the Full ROI, 1/2 ROI, and Zoom ROI buttons. Full ROI sets the ROI to the full height/width of the camera, ½ ROI sets the ROI to approximately ½ the height/width (centered), and Zoom ROI sets the ROI to the height/width determined by the present zoom region.
15. To change the zoom level of the image, click the Zoom checkbox. Within the displayed image, draw a rectangle around the portion of the imaged to zoomed into. To undo the zoom, uncheck the Zoom checkbox.
16. To rescale the intensity of the displayed image, adjust the Bit Depth slider. The leftmost position autoscales the image.
17. To obtain statistics from an analysis of the image, click the Stats checkbox. A second figure will open with the image, x and y projections, and statistics including the x and y centroid location, the x and y widths, a correlation parameter (indicating any rotation of beam), and an integrated intensity.
18. To change the algorithm used to fit the peak shape, change the Method slider. Choices include Gaussian, Asymmetric Gaussian, Super Gaussian, RMS, RMS cut peak, and RMS cut area.

19. To obtain the same statistics on a zoomed region of the image, use the Zoom checkbox to select the region and then select the Stats (Zoom) checkbox. Subsequent zoom changes do not trigger a recalculation of the statistics unless the Stats (Zoom) checkbox is toggled.
20. To obtain a histogram of the image, click the Show Hist checkbox.
21. Click the Show Raw checkbox to obtain the raw image collected (when unchecked the data are corrected for camera orientation)
22. To change the image axes from pixel number to mm, check the Use Calibration checkbox.
23. Click the Colorbar checkbox to obtain a colorbar showing intensity values.
24. The Lineout checkbox will give the x and y intensity lineout for a point clicked on in the image.
25. Show BM will display a cross at the saved location for the beam centroid. This indicator can be used to track the position of the beam over time. To update the value, click Update BM.
26. Change the colormap used for the image using the pulldown menu. Choices are jet, grayscale, or hot.
27. Click Save to save the data (or Save As to enter a custom file name).
28. To load saved data, click Load.
29. To obtain a separate figure of the displayed image, click Export. To save the image in the elog logbook, click Log Book.
30. To calibrate the profile monitor, click the Calibrate checkbox. Enter the radius of the target being used for calibration in the Target Rad. Box. Enter the number of points (N) to be used in the fitting. Click Reset. A circle with N X's will be overlaid on the image of the target. Center the circle on the target by clicking on the edges of the target image. The X closest to where you click will move and the circle will readjust. When the circle is centered around the target, click Apply Cal. To calibrate using an elliptically shaped image of the target, click Ellipse Fit. To change the orientation of the ellipse, click Ell. Orient.