Calibrating SPC3 external gate

The SPC3 factory gate calibration is only effective when using the internal gate generation. When an external gate signal in applied, it is necessary to calibrate the actual optical gate obtained for a specific electrical signal applied at the camera external inputs. This is necessary since the optical gate width and delay is also a function of the actual shape of the applied external gate signal.
It is first necessary to calibrate the gate size. This is possible by comparing photon counts obtained with and without the gating, when the camera is illuminated with a constant light source. An example code for this aim is the following:

```
//SPC3 constructor and parameter setting
SPC3_Constr(&spc3, Advanced,"");
SPC3_Set_Camera_Par(spc3, 100, 30000,
    300, 1, Disabled, Disabled,Disabled);
SPC3_Set_DeadTime(spc3, 400);
SPC3_Apply_settings(spc3);
printf("Expose the SPC3 camera to a time-
    independent luminous signal\n(be
    careful! room light might oscillate
    at 50 or 60 Hz and should be
    avoided)\nPress ENTER to continue
    ...\n");
getchar();
if((f = fopen("GateValues.txt","w")) ==
    NULL)
{
printf("Unable to open the output
    file.\n");
break;
}
//photon counts without any gate.
// Remove also external gate
SPC3_Set_Gate_Mode(spc3, Continuous);
SPC3_Apply_settings(spc3);
SPC3_Prepare_Snap(spc3);
SPC3_Get_Snap(spc3);
SPC3_Average_Img(spc3, data, 1);
gateoff = mean_double(data,2048);
printf("Gate OFF counts:
    %.2f\n",gateoff);
fprintf(f,"Gate OFF counts:
    %.2f\n",gateoff);
printf("Acquiring:\n\nGate\t\tMean\t\tAct
    ual Gate\t\t\n");
//photon counts for gate witdh ranging
    from 0% to 100%
for(i=0;i<=100;i+=1)
{
//apply the new gate width
printf("Set the new gate width and press
    ENYER when done.\n");
getchar();
SPC3_Prepare_Snap(spc3);
SPC3_Get_Snap(spc3);
SPC3_Average_Img(spc3, data,1);
y[i] = mean_double(data,2048);
y[i+101] = y[i]/gateoff*100; //actual
    gate width calculated from photon
    counts
x[i]=(double) i;
printf("%3.0f\t\t%.2f\t\t%.2f\n",x[i],y[i
    ],y[i+101]);
fprintf(f,"%.0f %.2f
    %.2f\n",x[i],y[i],y[i+101]);
}
fclose(f);
printf("\n");
```

Once the calibrated gate width is known, the calibration of the actual gate shift with respect to the laser excitation is possible, but only *after* the camera is mounted into a simple measurement setup composed by a laser, the camera and an optical table. It is also very important that both the laser head (or the tip of the fibre in case of fiberpigtailed lasers) and the camera are firmly mounted on the optical table (an optical breadboard is also ok) and do not move at all during the calibration experiment. The measurement is then easily done by directly shining the laser onto the array, without interposing any fluorescent sample or filter, and sweeping the laser pulse or the gate signal over a full gate period. By inspecting the measurement and finding the laser peak, it is possible to

evaluate the shift between the actual laser pulse and the *gate* signal. It should be noted that the result of this measurement will be the convolution of the laser pulse with the actual gate applied to the detector, so a cross check of the calibrated gate width and shape is also possible if the laser pulse shape in known with sufficient precision.

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Contact

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