Latest analysis with the new Ivan's constants:

3.21.2006

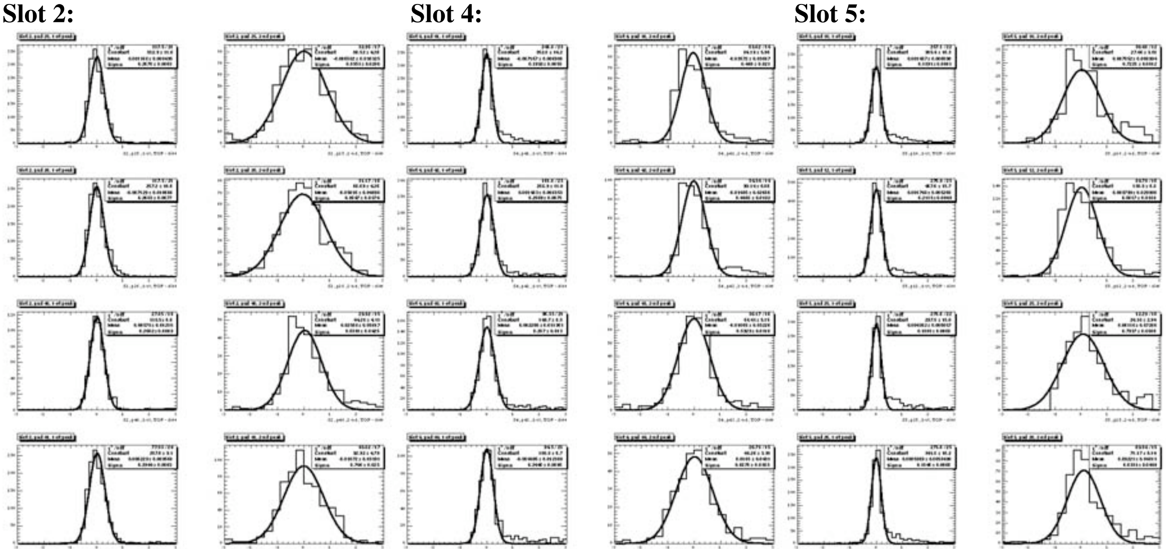
New epsilons from the variable lambda MC simulation:

```
//***********************************************************************************************
// However, to do the cross-talk & charge sharing right, we need individual corrections for each pad.
// The following offsets were determined after Jose's calibration to determine TOP_measured, and
// using TOP_expected from Ivan's MC with a variable lambda analysis, and requiring dTOP = 0. This determines timing
// epsilon offsets. In the rest of the analysis, I assume that these epsilons are due to the calibration errors
// and assign them to TOP_measured. This is very important !!!!!
// The 2-nd tweak (in brackets) made it more precise (probably due to a change in the cross-talk alghoritm); the 3-rd tweak is from 3.20.2006,
// when Ivan improved numbers after many changes in his program, including tweaking the geometry of mirror,etc.
//***********************************************************************************************
// Example of slot 2:
time_offset_slot2_phillips_peak_1[7] = -0.3864+(-0.061)-0.056;
time_offset_slot2_phillips_peak_1[8] = -0.3894+(-0.009)-0.057;
time_offset_slot2_phillips_peak_1[9] = -0.4975+(-0.0559)-0.040;
time_offset_slot2_phillips_peak_1[10] = -0.3476+(-0.081)-0.032;
time_offset_slot2_phillips_peak_1[23] = -0.4696+(-0.0992)-0.041;
time_offset_slot2_phillips_peak_1[24] = -0.3291+(-0.051)-0.052;
time_offset_slot2_phillips_peak_1[25] = -0.5517+(-0.0739)-0.048;
time_offset_slot2_phillips_peak_1[26] = -0.494+(-0.074)-0.050;
time_offset_slot2_phillips_peak_1[40] = -0.323+(-0.061)-0.054;
time_offset_slot2_phillips_peak_1[41] = -0.402+(-0.0765)-0.058;
time_offset_slot2_phillips_peak_1[55] = -0.2467+(-0.0961)-0.047;
time_offset_slot2_phillips_peak_1[57] = -0.2295+(-0.121)-0.059;
time_offset_slot2_phillips_peak_1[58] = -0.2272+(-0.0847)-0.074;

time_offset_slot2_phillips_peak_2[7] = -0.9717+(-0.091)-0.052;
time_offset_slot2_phillips_peak_2[8] = -0.0607+(-0.0439)-0.016;
time_offset_slot2_phillips_peak_2[9] = -1.389+(-0.0588)+0.059;
time_offset_slot2_phillips_peak_2[10] = -0.3546+(-0.04295)-0.029;
time_offset_slot2_phillips_peak_2[23] = -1.083+(-0.0208)+0.035;
time_offset_slot2_phillips_peak_2[24] = 0.0638+(-0.0427)-0.008;
time_offset_slot2_phillips_peak_2[25] = -1.389+(0.0179)+0.018;
time_offset_slot2_phillips_peak_2[26] = -0.3525+(-0.0477)+0.064;
time_offset_slot2_phillips_peak_2[40] = 0.29+(-0.1676)-0.083;
time_offset_slot2_phillips_peak_2[41] = -1.04+(-0.0147)-0.025;
time_offset_slot2_phillips_peak_2[55] = -0.579+(0.0392)-0.121;
time_offset_slot2_phillips_peak_2[57] = -0.8223+(0.0108)-0.015;
time_offset_slot2_phillips_peak_2[58] = -0.1027+(-0.005)-0.063;
…….
```

Examples of (TOP_measured-TOP_expected) after the latest tweak (position 1, run 12b):

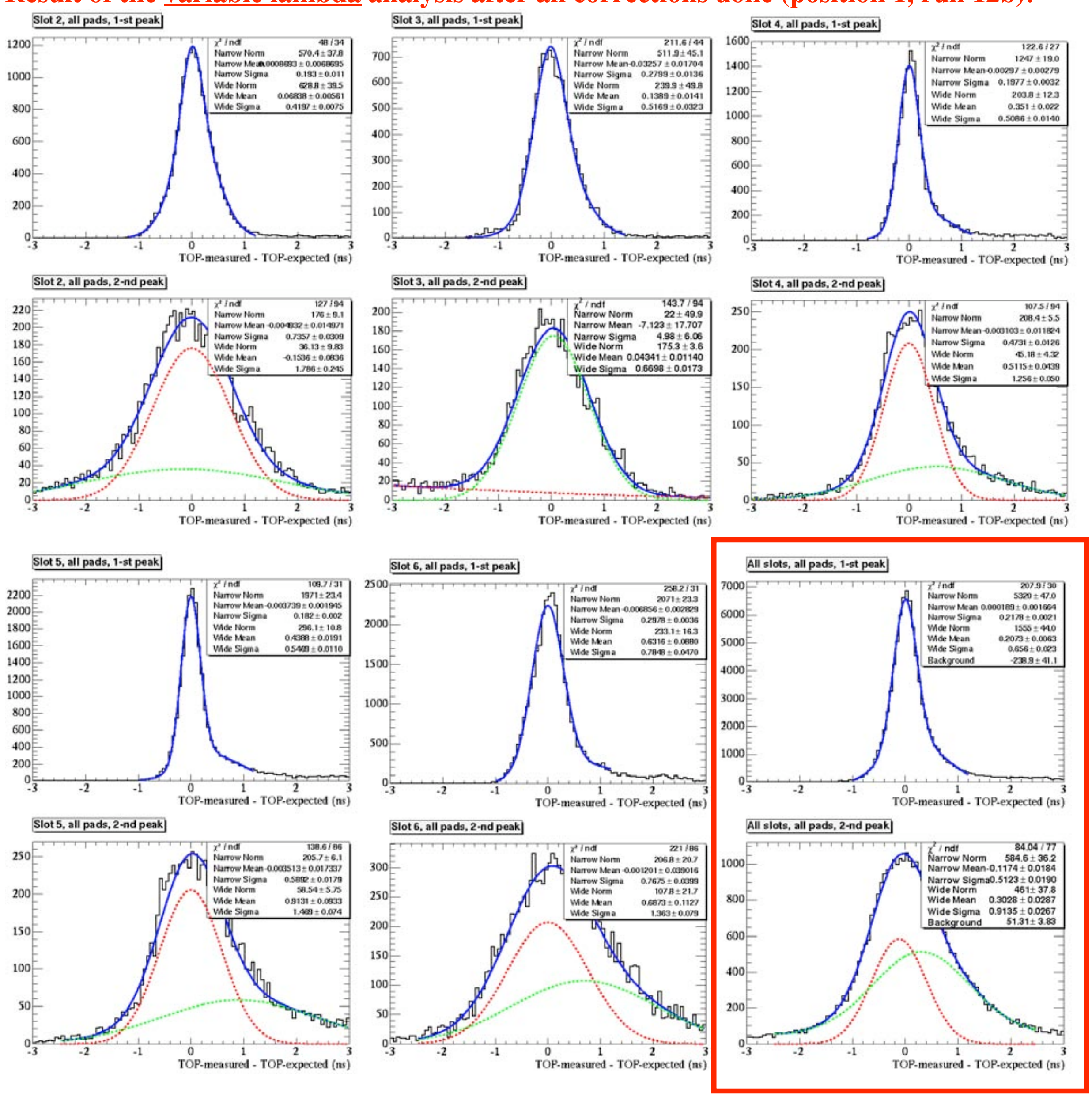
Slot 2: **Slot 4:** **Slot 5:**



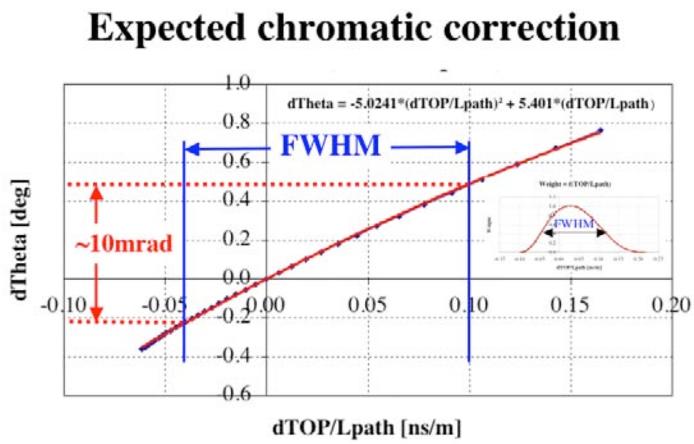
```
// Additional global slot offsets (!?!?); found necessary to add this after the previous step was finished.
// Not completely clear why I need it. Perhaps, individual fits were not precise enough.
//
   for (Int_t i=1; i<65;i++)
 {
  time_offset_slot2_phillips_peak_1[i] = time_offset_slot2_phillips_peak_1[i]-0.112;
  time_offset_slot3_phillips_peak_1[i] = time_offset_slot3_phillips_peak_1[i]-0.043;
  time_offset_slot4_phillips_peak_1[i] = time_offset_slot4_phillips_peak_1[i]-0.042;
  time_offset_slot5_phillips_peak_1[i] = time_offset_slot5_phillips_peak_1[i]-0.007;
  time_offset_slot6_phillips_peak_1[i] = time_offset_slot6_phillips_peak_1[i]-0.130;

  time_offset_slot2_phillips_peak_2[i] = time_offset_slot2_phillips_peak_2[i]-0.164;
  time_offset_slot3_phillips_peak_2[i] = time_offset_slot3_phillips_peak_2[i]-0.112;
  time_offset_slot4_phillips_peak_2[i] = time_offset_slot4_phillips_peak_2[i]-0.029;
  time_offset_slot5_phillips_peak_2[i] = time_offset_slot5_phillips_peak_2[i]-0.124;
  time_offset_slot6_phillips_peak_2[i] = time_offset_slot6_phillips_peak_2[i]-0.441;
 }
```

Result of the variable lambda analysis after all corrections done (position 1, run 12b):



Chromatic correction using a theoretical correlation between $d\Theta_C$ and dTOP/Lpath, <u>based on my spreadsheet</u>:



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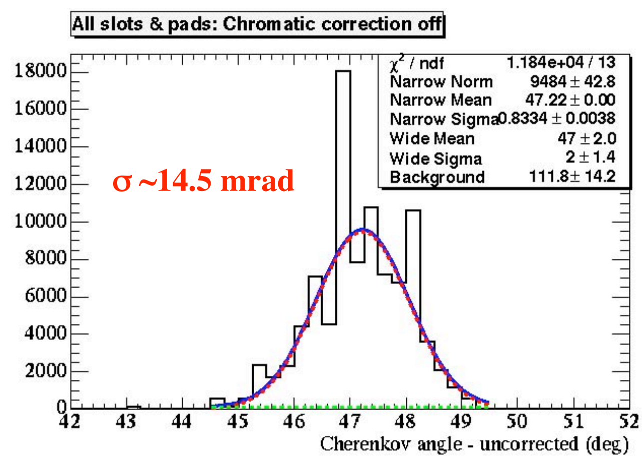
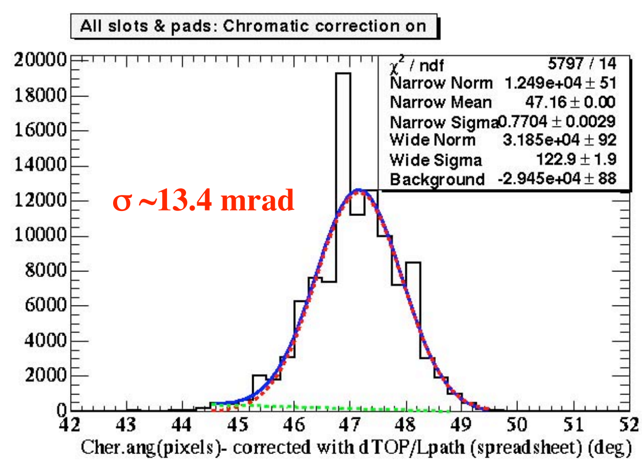
Apply the spreadsheet correction to data (position 1, run 12b):

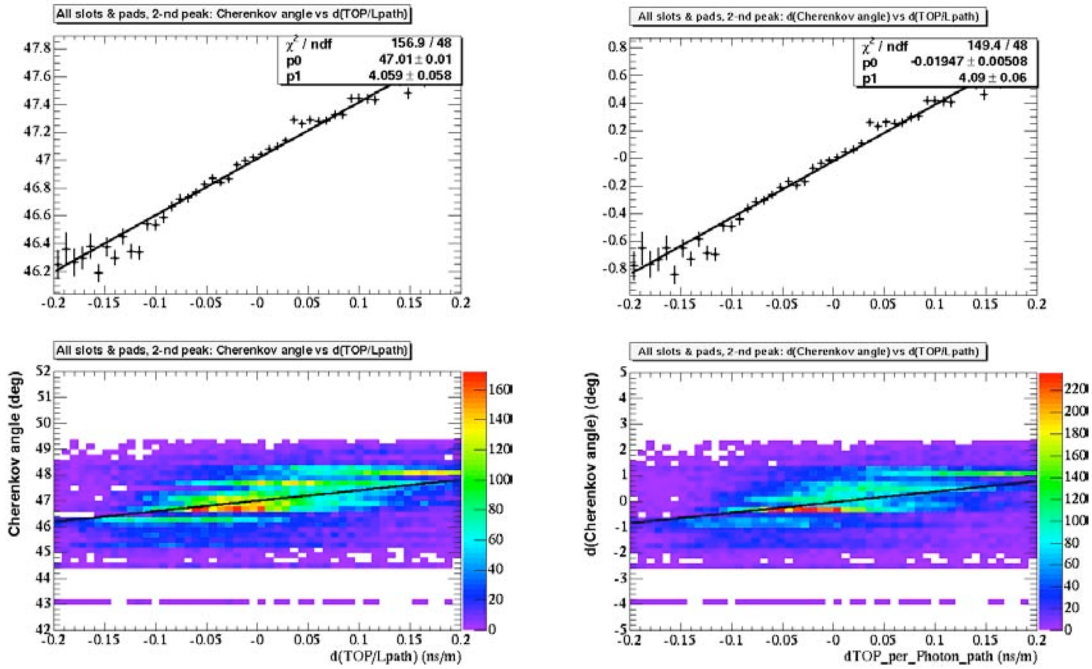




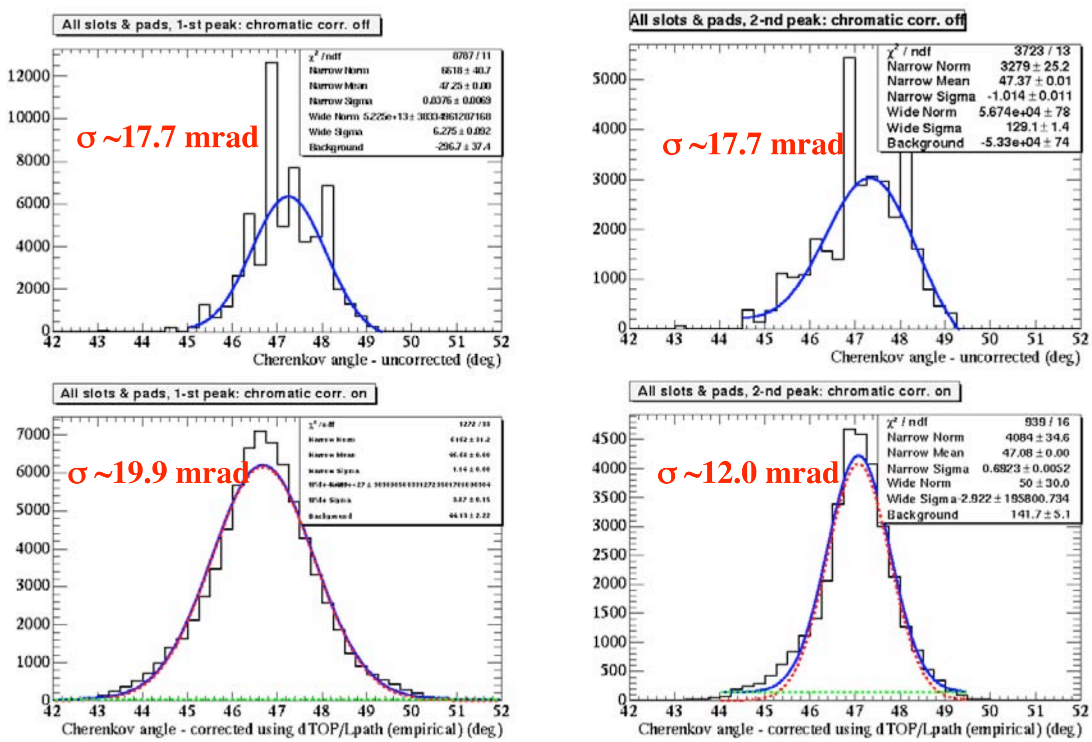
- **Apply the correction to the 2-nd peak only.**
- **The corrected resolution is better.**

The empirical correction from data (peak 2 only):

3.24.2006



Apply the empirical correction to data:



- Apply the same correction to both peaks.
- The correction works only for the 2-nd peak, as one wopuld expect.

Latest analysis as a function of position:

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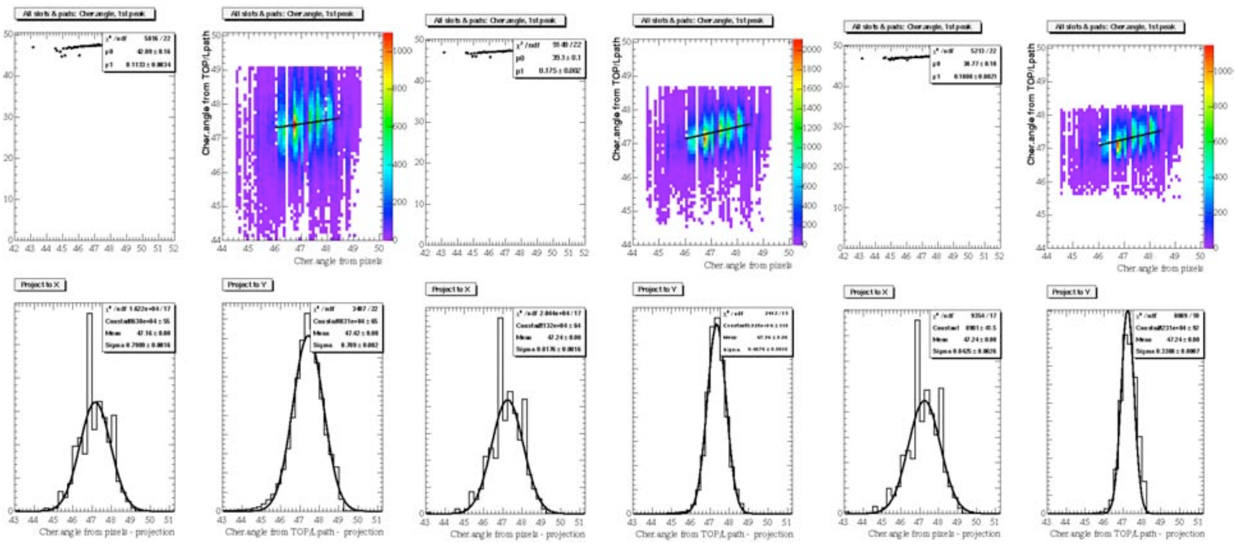
- Fit the projections with a single Gaussian fctn.

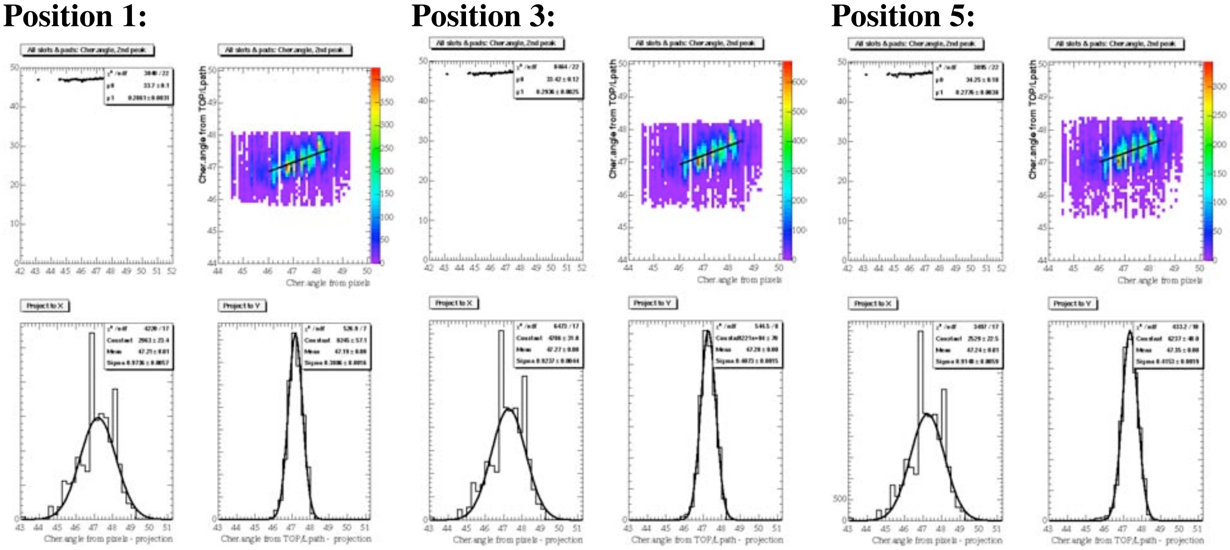
1a) Correlation between Cherenkov angle from pixels and TOP – peak 1:

Position 1: **Position 3:** **Position 5:**



1b) Correlation between Cherenkov angle from pixels and TOP – peak 2:

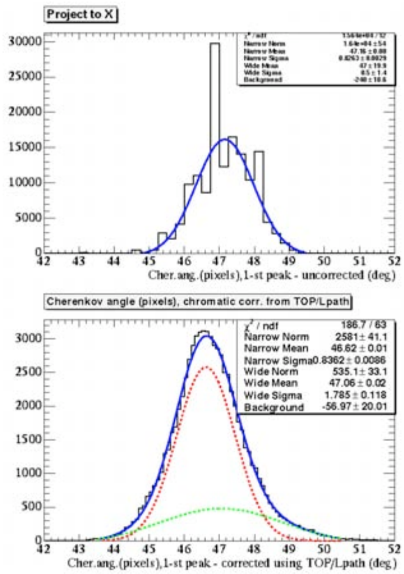
Position 1: **Position 3:** **Position 5:**



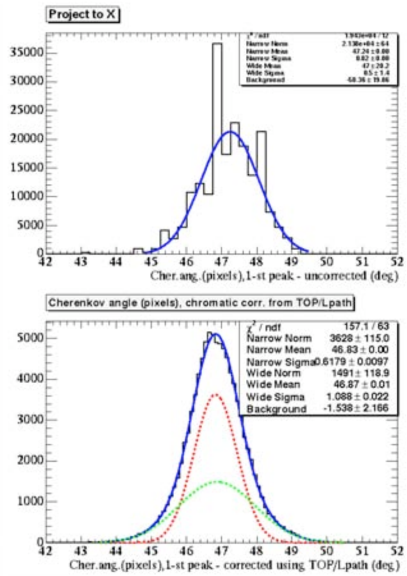
2a) Peak 1 using pixels (uncorrected & corrected with TOP/Lpath):

- The uncorrected spectra fitted with a single Gaussian fctn.

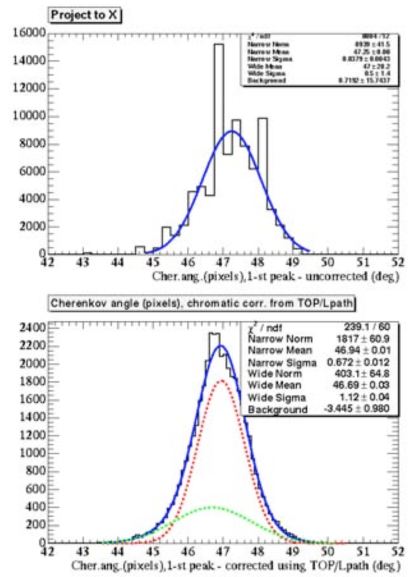
Position 1:



Position 3:



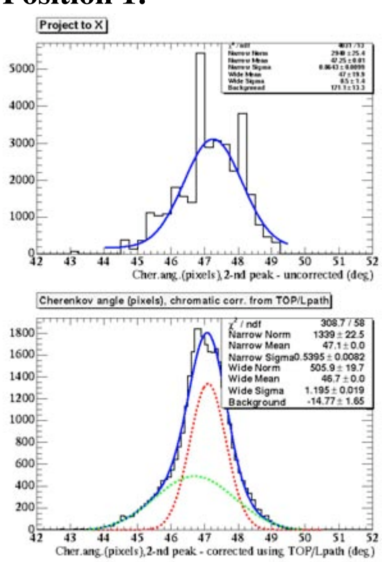
Position 5:



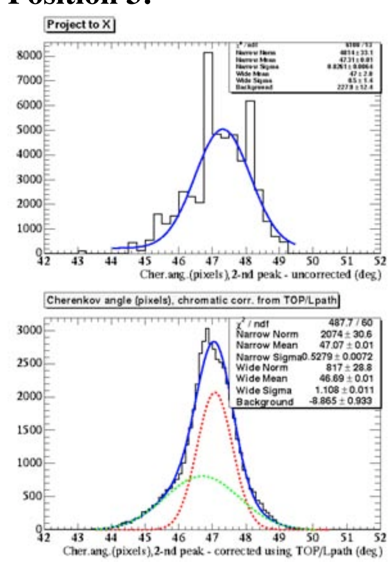
2b) Peak 2 using pixels (uncorrected & corrected with TOP/Lpath):

- The uncorrected spectra fitted with a single Gaussian fctn.

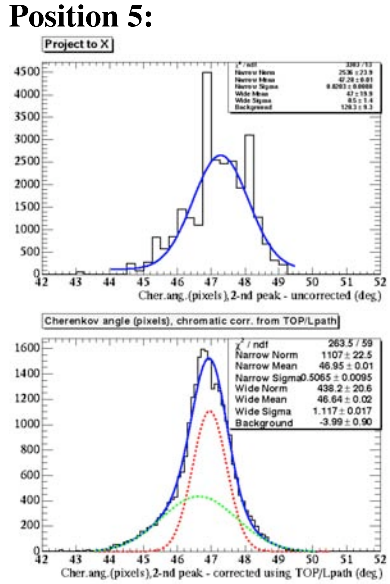
Position 1:



Position 3:



Position 5:

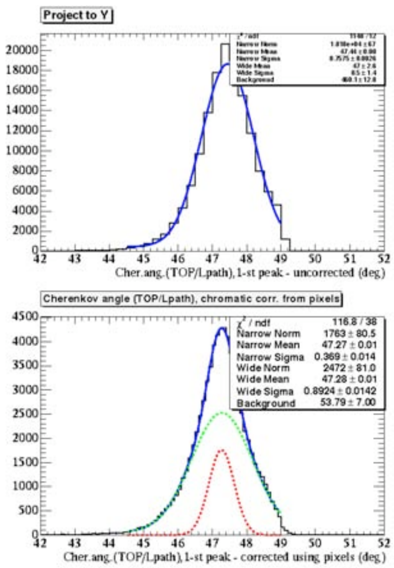


- When two Gaussians are involved, quote a weighted average of two sigmas

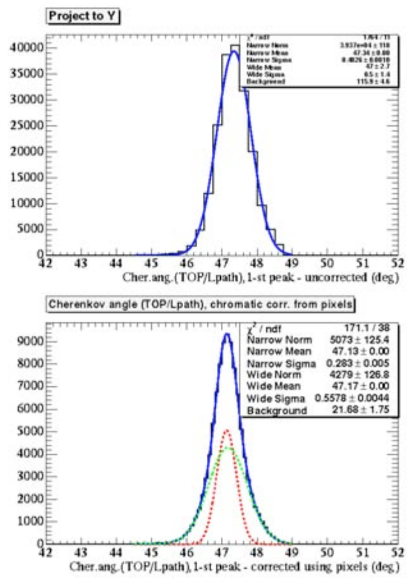
3a) Peak 1 using TOP (uncorrected & corrected with pixels):

- The uncorrected spectra fitted with a single Gaussian fctn.

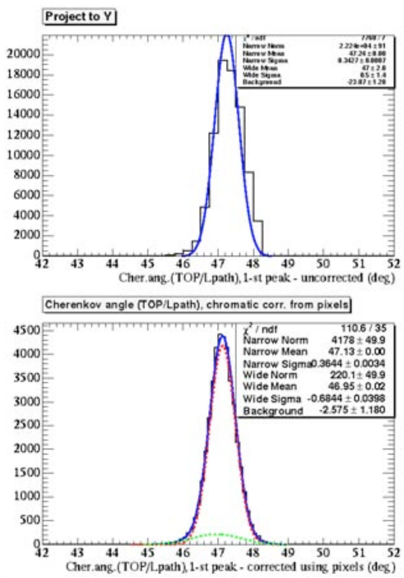
Position 1:



Position 3:



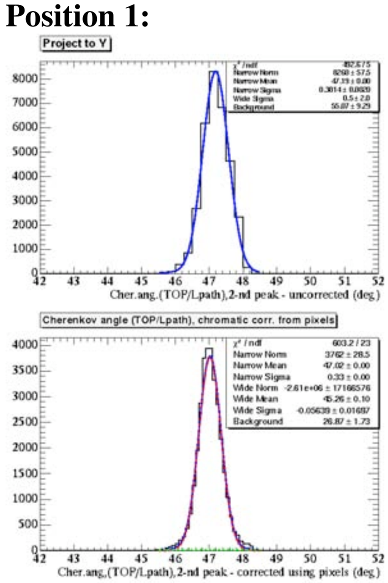
Position 5:



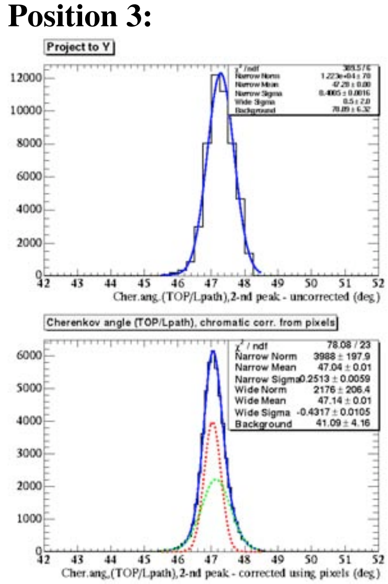
3b) Peak 2 using TOP (uncorrected & corrected with pixels):

- The uncorrected spectra fitted with a single Gaussian fctn.

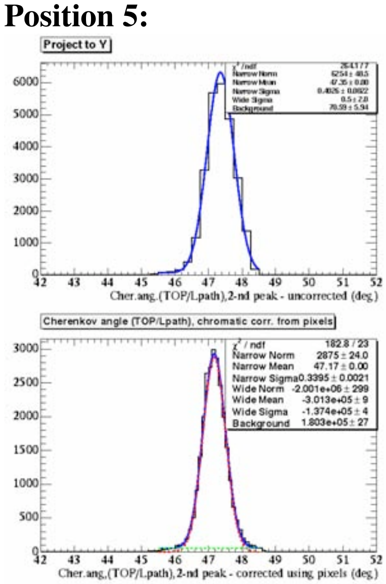
Position 1:



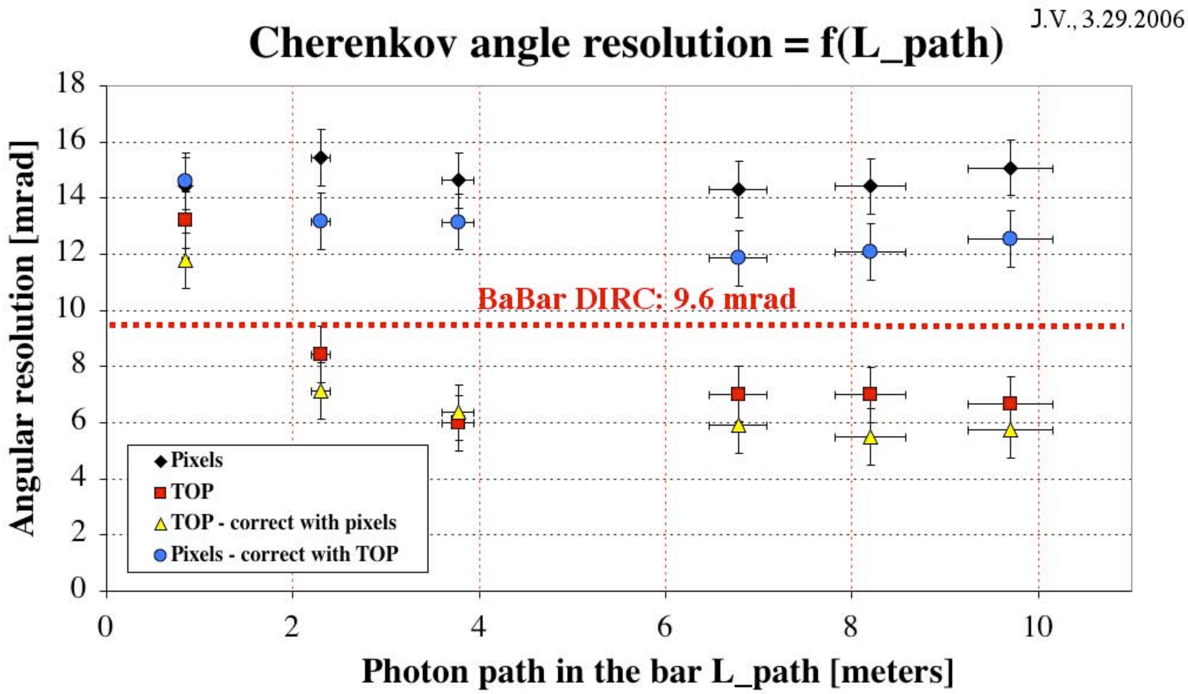
Position 3:



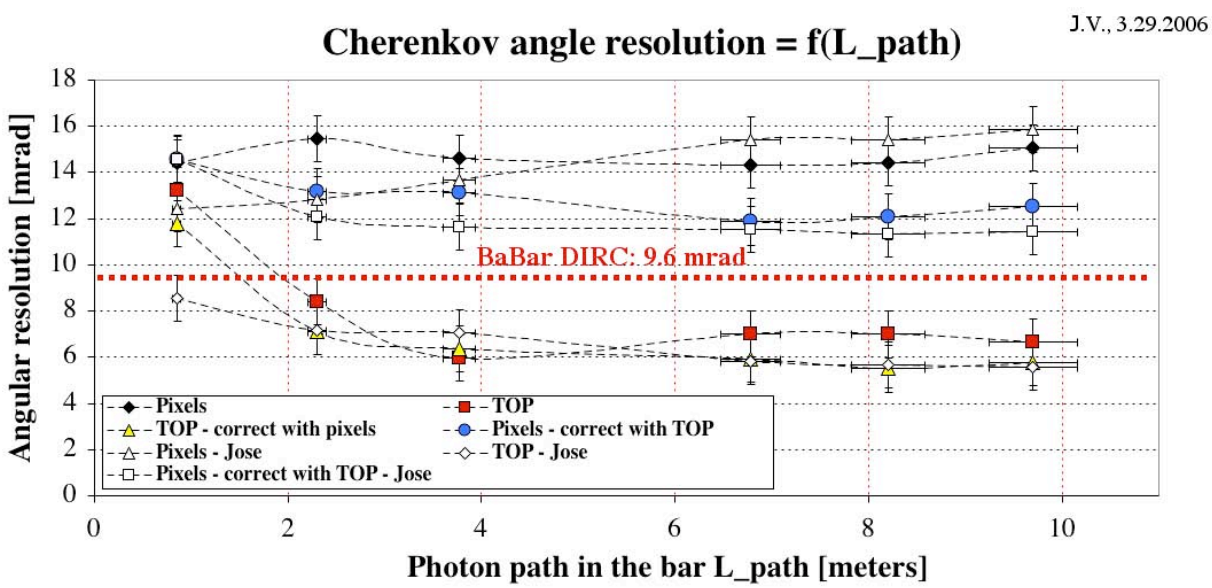
Position 5:



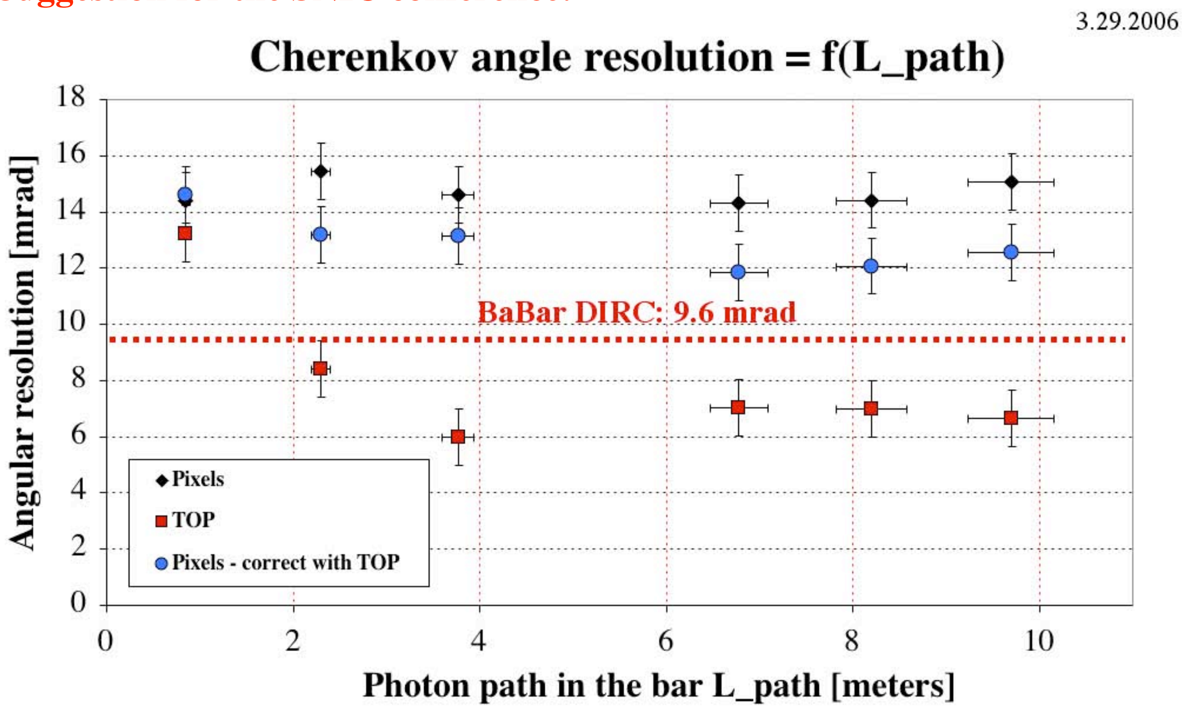
- When two Gaussians are involved, quote a weighted average of two sigmas



Comparison with Jose:



Suggestion for the SNIC conference:



2. The 2-nd analysis using the latest constants from Ivan's program (Cherenkov angles & dir. cosines) - just before he left

Direct							
Position along the bar	Run	Ave. photon L_path [m]	Error [m]	Ch. ang. resol. pixels - simply project [mrad]	Ch. ang. resol. TOP/L_path - simply project [mrad]	Ch. ang. resol. pixels - correct with TOP/L_path [mrad]	Ch. ang. resol. TOP/L_path - correct with pixels [mraD]
1	12b	0.85	0.04	14.42059337	13.21989529	14.59336824	11.77159423
2							
3	13	2.3	0.1	15.45375218	8.422338569	13.17321125	7.133237638
4							
5	14	3.77	0.17	14.62303665	5.980802792	13.14705281	6.359511344
6							

Backward							
Position along the bar	Run	Ave. photon L_path in bar [m]	Error [m]	Ch. ang. resol. pixels - simply project [mrad]	Ch. ang. resol. TOP/L_path - simply project [mrad]	Ch. ang. resol. pixels - correct with TOP/L_path [mrad]	Ch. ang. resol. TOP/L_path - correct with pixels [mrad]
1	12b	9.7	0.46	14.31588133	7.02617801	11.85992646	5.92495637
2							
3	13	8.2	0.38	14.41710297	6.989528796	12.07394315	5.497109264
4							
5	14	6.78	0.31	15.08376963	6.656195462	12.54827221	5.759162304
6							

Both						Benitez		
Ave. photon L_path [m]	Error [m]	Ch. ang. resol. pixels - simply project [mrad]	Ch. ang. resol. TOP/L_path - simply project [mrad]	Ch. ang. resol. pixels - correct with TOP/L_path [mrad]	Ch. ang. resol. TOP/L_path - correct with pixels [mraD]	Ch. ang. resol. pixels - simply project [mrad]	Ch. ang. resol. TOP/L_path - simply project [mrad]	Ch. ang. resol. pixels - correct with TOP/L_path [mrad]
0.85	0.04	14.42059337	13.21989529	14.59336824	11.77159423	12.42	8.535	14.56
2.3	0.1	15.45375218	8.422338569	13.17321125	7.133237638	12.81	7.137	12.1
3.77	0.17	14.62303665	5.980802792	13.14705281	6.359511344	13.69	7.068	11.64
6.78	0.31	14.31588133	7.02617801	11.85992646	5.92495637	15.41	5.828	11.52
8.2	0.38	14.41710297	6.989528796	12.07394315	5.497109264	15.41	5.656	11.35
9.7	0.46	15.08376963	6.656195462	12.54827221	5.759162304	15.88	5.572	11.46