Hello all, I was able to reproduce Matteo's results with the new dE/dx parametrization from BaBar Run 6. The agreement both for K/pi separation and dE/dx resolution is confirmed. Here is an example for theta = 0.5 and 1.0, using Matteo's new proposed parameters:
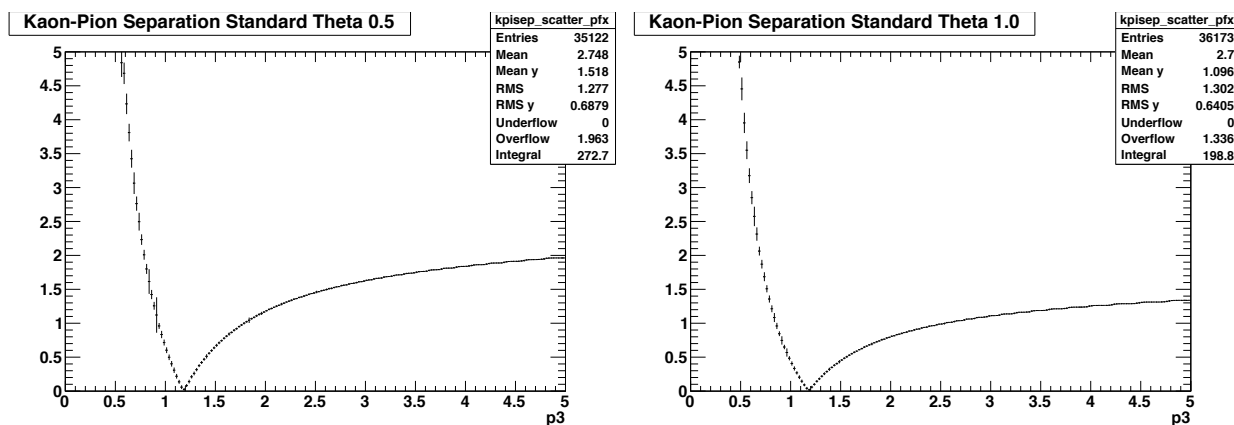
Now that K/pi separation and dE/dx resolution are simultaneously correct, the derivation of the "effective cluster counting" parameters is very constrained. If you look at my talk from the latest collaboration meeting or the previous DCH meeting, you can see the relevant equations. Basically the p2 and p3 are fixed to 1/2 and -1/2 by basic principles. The p1 parameter is given by

$$p_1 = \frac{C}{\sqrt{N_{min}\epsilon}}$$

where C is the minimum of the real dE/dx curve in FastSim, Nmin is the minimum number of clusters produced per cm in the gas, and epsilon is our efficiency of cluster counting. With reasonable choices of Nmin = 13 and epsilon = 0.6, the results are surprising:
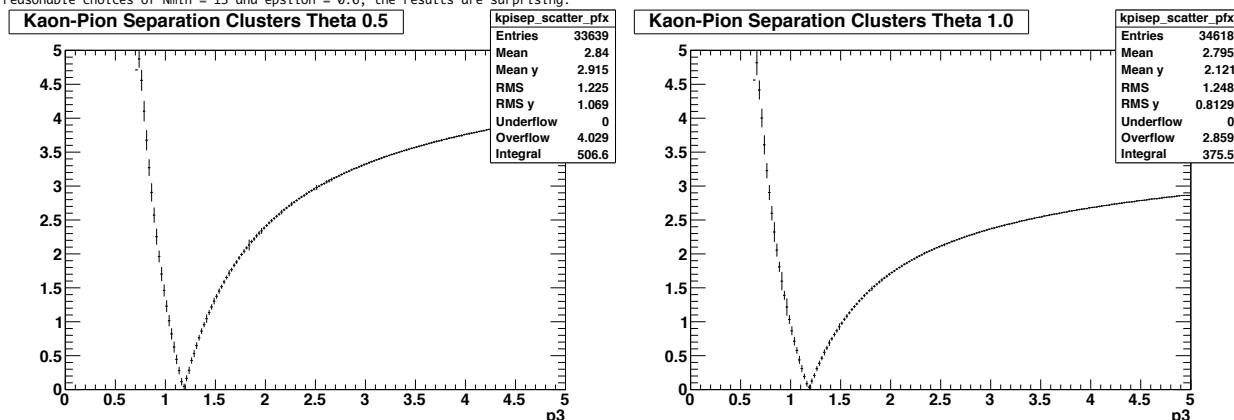
As you can see, the K/pi separation is more than twice as good, which is likely "too good to be true". Unfortunately the derivation of the parameters leaves little flexibility for worsening the performance, one could reduce the efficiency or suppose that the minimum cluster density in the chosen gas will be lower, but even then those parameters are under a square root. There is the option of arbitrarily inflating p1 to give results closer to those expected, but the derivation gives no physical motivation.

See you soon,
Jean-François Caron