Sweet spot in θ? Continuum?

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Dear gentlemen,

actually, I am not pessimistic. Among the solutions we know (SPACAL, HF, DREAM, RD52/Pb and RD52/Cu) is there a sweet spot that optimizes hadron and EM resolutions? These cases are on a continuum:

module	absorber	η_S	η_C	$\chi = (1-\eta_S)/(1-\eta_C)$	tan θ	θ
SPACAL	Pb	1.0	0.0	0.0	∞	$\pi/2$ =1.57
RD52	Pb			0.3	3.3	1.28
DREAM	Cu	0.71	0.20	0.36	2.78	1.23
RD52	Cu					
HF	Fe	0.0	0.2	1.2	0.83	0.88

Are there other parameters to performance?

In Sehwook's Fig. 14(b), the rotation angle could be slightly larger than 30-degs. to make the distribution more vertical and therefore narrower when projected onto the S-axis. Sehwook properly did not gild the lily, which would have made the distribution look better.

θ labels a calorimeter. Is there an optimum θ ? It is possible to imagine fibers of different diameters and/or groove spacings to make whatever values of η_S and η_C one likes. On 4th, I once contemplated a third fiber type to optimize measuring the neutrons, but there are few good choices here, and the conclusion was that time-history was best.

When I was at TTU for a semester, Igor helped me use C++ to analyze the BGO+DREAM hadron data (π^+, 200 GeV). The dual-readout in the BGO was weak, so I added the S signals and the C signals from BGO and DREAM (not justified). And, I rotated the C-S plot (around an arbitrary point of my choosing, not justified) to make the distribution vertical. I did a root-fit ($S = S_0 + a \times C + b \times C^2$) to the distribution to check that it was vertical, and there was a quadratic term of about 4% in C. Sehwook's plot might also have a quadratic term in it, but it is hard to see in this pot. The projected plot could be narrowed if this quadratic term were taken out using C.

Principles of dual-readout calorimetry (1)

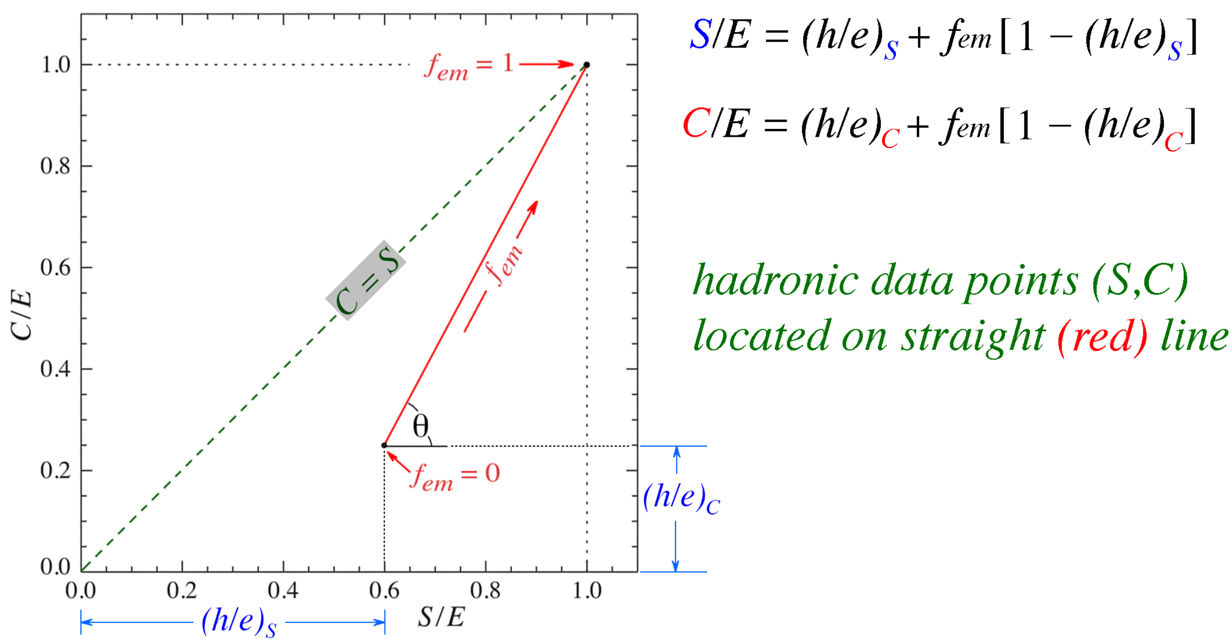

Figure 1: C/E vs. S/E plot showing the positions of $\eta_S = (h/e)_S$ and $\eta_C = (h/e)_C$. The red line with slope *tan* θ is a straight line independent of particle energy and particle type. Particles and jets with differing EM fractions simply populate the red line differently but, being on this red line, they all have the same dual-readout energy. From this figure, tan $\theta = (1 - \eta_C)/(1 - \eta_S)$.