
Subject: Re: PID combiner with different detector
Posted by [donghee](#) on Tue, 05 Nov 2013 10:05:24 GMT
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Dear Ronald,

Now I am clear for the equal probability for absent PID info in certain detector.

If I use EMC and MUO, and an electron will identify with a single piece of detector as like
 $P_e(\text{EMC}) = 0.9$ (90% probability at EMC)
 $P_e(\text{MUO}) = 0$ (no information at MUO)

For other particles with EMC,
 $P_{\mu}(\text{EMC}) = 0.1$
 $P_{\pi,k,p}(\text{EMC}) = 0.5$

And for MUO detector, the probabilities will be reset as 0.2 even for all other particles.
 $P_e(\text{MUO}) = 0.2$
 $P_{\mu,\pi,k,p}(\text{MUO}) = 0.2$

Then will calculate a global probability as like
 $P_e(\text{EMC}, \text{MUO}) = P_e(\text{EMC}) * P_e(\text{MUO}) = 0.9 * 0.2 = 0.18$
 $P_{\mu}(\text{EMC}, \text{MUO}) = P_{\mu}(\text{EMC}) * P_{\mu}(\text{MUO}) = 0.1 * 0.2 = 0.02$
 $P_{\pi}(\text{EMC}, \text{MUO}) = P_{\pi}(\text{EMC}) * P_{\pi}(\text{MUO}) = 0.5 * 0.2 = 0.1$
 $P_{k,p}(\text{EMC}, \text{MUO}) = P_{k,p}(\text{EMC}) * P_{k,p}(\text{MUO}) = 0.5 * 0.2 = 0.1$
 $P_{\pi,k,p}(\text{EMC}, \text{MUO}) = P_{\pi,k,p}(\text{EMC}) * P_{\pi,k,p}(\text{MUO}) = 0.5 * 0.2 = 0.1$
and so on.

After that will be normalized with
 $P_e(\text{EMC}, \text{MUO}) + P_{\mu}(\text{EMC}, \text{MUO}) + P_{\pi}(\text{EMC}, \text{MUO}) + P_{k,p}(\text{EMC}, \text{MUO}) + P_{\pi,k,p}(\text{EMC}, \text{MUO}) = 0.5$

So finally I can have normalized global PID probabilities
 $P_e(\text{EMC}, \text{MUO}) = 0.18 / 0.5 = 0.36$
 $P_{\mu}(\text{EMC}, \text{MUO}) = 0.02 / 0.5 = 0.04$
 $P_{\pi}(\text{EMC}, \text{MUO}) = 0.1 / 0.5 = 0.20$
 $P_{k,p}(\text{EMC}, \text{MUO}) = 0.1 / 0.5 = 0.20$
 $P_{\pi,k,p}(\text{EMC}, \text{MUO}) = 0.1 / 0.5 = 0.20$

This is a story of PID!
If I am wrong, correct me again.

Thanks,
Donghee