
Subject: MisID vs Impurity

Posted by [Klaus Götzen](#) on Wed, 21 Nov 2012 14:48:34 GMT

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Dear all,

since my mic died during the EVO meeting yesterday, I'll try to explain what I wanted to say concerning misID and impurity.

The issue I wanted to point out is, that the impurity is a quantity which is not independent of the fluxes, whereas the misID is. The misID is the fraction of false positive identified particles of a certain species. E.g. the pion-misID of a kaon selector is

$$\text{misID}(\pi|K) = \# \text{selected } \pi / \# \text{total } \pi$$

Obviously this quantity is flux independent, since the flux would go into nominator and denominator. Please note, that there is not information about the selected number of kaons in this quantity, although it is a property of the kaon selector. It's just the probability for another particle species to be accepted by the kaon selector.

On the other hand the impurity is defined as

$$\text{impurity}(\pi|K) = 1 - \text{purity} = 1 - \# \text{sel. } K / (\# \text{sel. } \pi + \# \text{sel. } K) = \# \text{sel. } \pi / (\# \text{sel } K + \# \text{sel } \pi)$$

First of all, these two things are different quantities. The other issue is, that a change in relative fluxes would change the impurity (as well as the purity of course), since (with F being the relative π/K flux factor change in the upper equation)

$$\text{impurity} = F \cdot \# \text{sel } \pi / (\# \text{sel. } K + F \cdot \# \text{sel } \pi) \neq \# \text{sel. } \pi / (\# \text{sel } K + \# \text{sel } \pi)$$

I think the quality measure of a particular selection algorithm should not depend on the current physical environment (like relative fluxes).

Of course I'm open for discussions in that respect.

Cheers,
Klaus