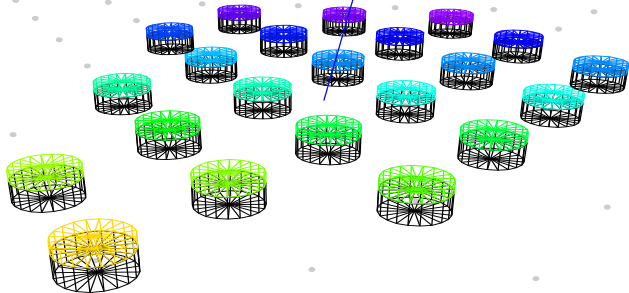


Layered Surface Detector for $\mu^\pm - (\gamma, e^\pm)$ separation

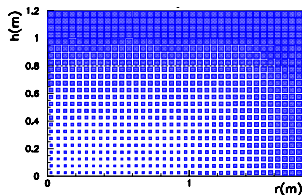


Ioana C. Mariş (Université Libre de Bruxelles)

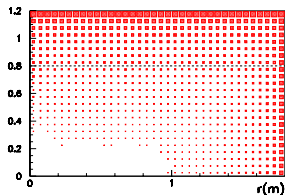
(A. Letessier-Selvon, P. Billoir, M. Blanco, I. C. Mariş, M. Settimo, NIM A767 (2014), arxiv:1405.5699)

The idea: optical separation of a Water Cherenkov Tank

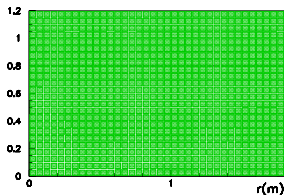
photons



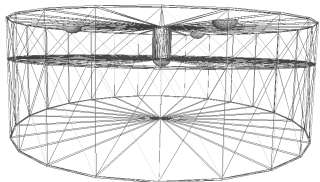
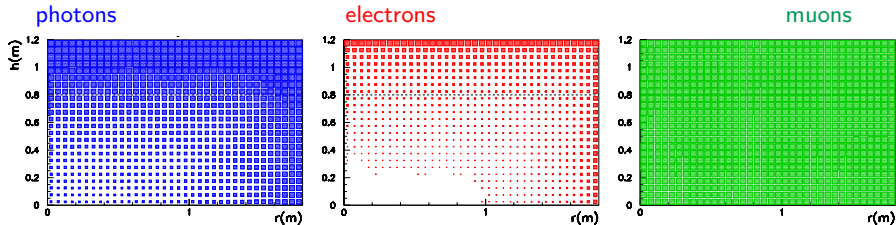
electrons



muons



The idea: optical separation of a Water Cherenkov Tank

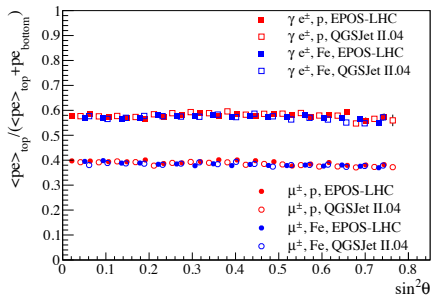


$$\begin{pmatrix} S_{\text{top}} \\ S_{\text{bot}} \end{pmatrix} = \mathcal{M} \begin{pmatrix} S_{\text{EM}} \\ S_{\mu} \end{pmatrix} = \begin{pmatrix} a & b \\ 1-a & 1-b \end{pmatrix} \begin{pmatrix} S_{\text{EM}} \\ S_{\mu} \end{pmatrix}$$

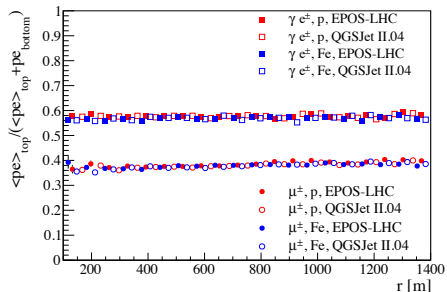
$$\begin{pmatrix} S_{\text{EM}} \\ S_{\mu} \end{pmatrix} = \mathcal{M}^{-1} \begin{pmatrix} S_{\text{top}} \\ S_{\text{bot}} \end{pmatrix}$$

Universality of a and b

independent of distance to axis

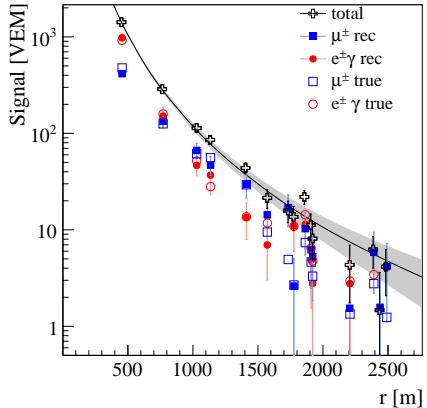
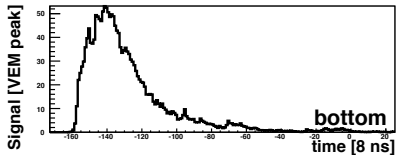
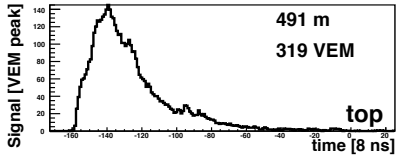


independent of zenith angle

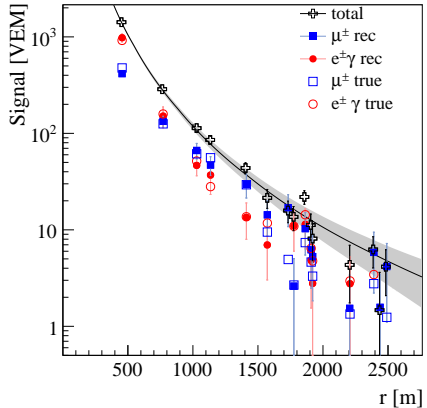
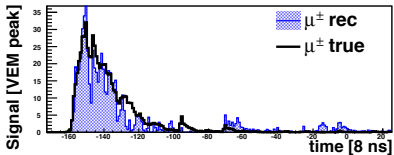
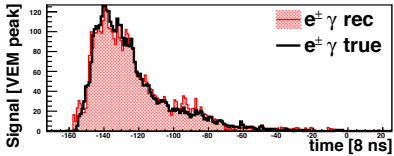


independent of hadronic models/primary

Not only good resolution for total signal but also time distributions



Not only good resolution for total signal but also time distributions

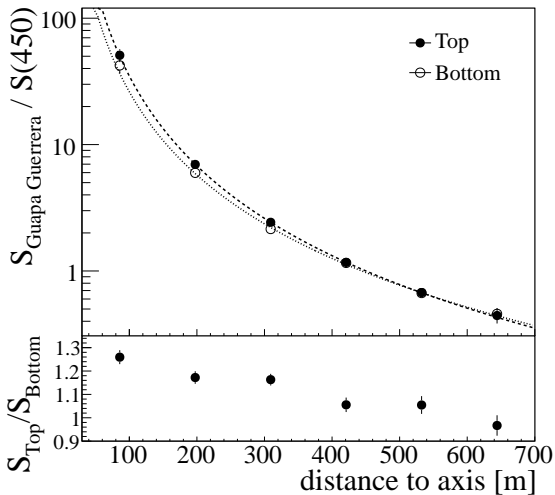


Guapa Guerrero, born on 26th of February 2014



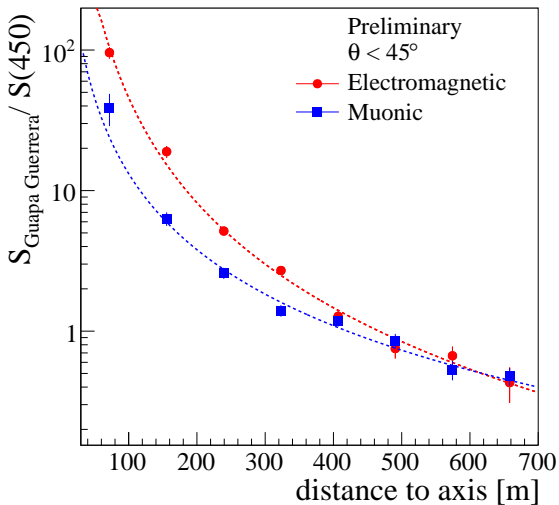
The detector performed very well (as expected)

900 events reconstructed ($E > 0.03 \text{ EeV}$, $\theta < 45^\circ$)



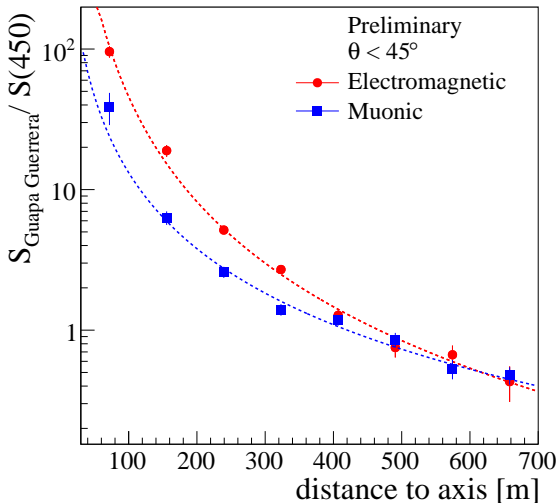
The detector performed very well (as expected)

900 events reconstructed ($E > 0.03 \text{ EeV}$, $\theta < 45^\circ$)



The detector performed very well (as expected)

900 events reconstructed ($E > 0.03 \text{ EeV}$, $\theta < 45^\circ$)



Wanna build a surface detector → Think of LSD!