exploiting the geomagnetic distortion of inclined showers

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muon density in the tranverse plane of inclined showers

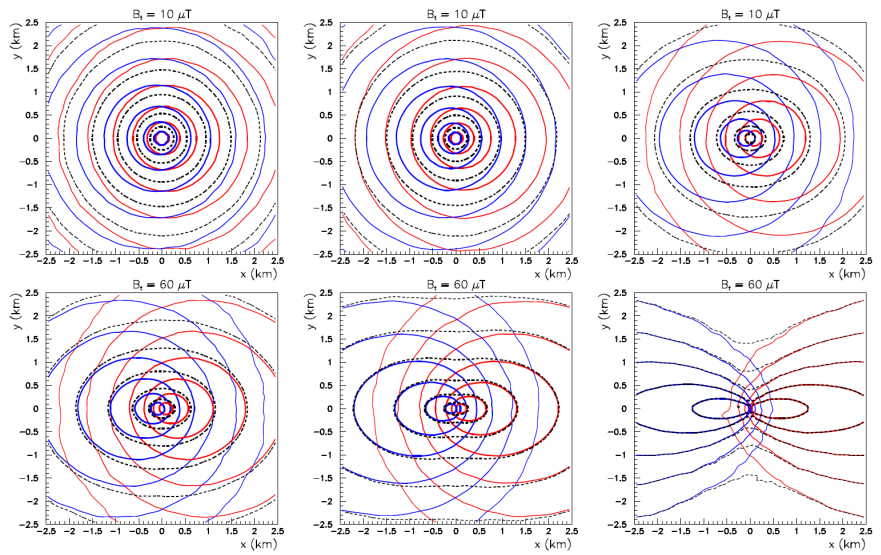


Figure 5: Contour levels of the muon density in the transverse plane, for a proton shower of 10 EeV at 3 zenith angles (from left to right: 64, 72 and 80 deg), with a transverse field of 10 or 60 μT along y axis. In red: μ^+, in blue:μ^-, in black (dashed): total. The lines correspond to equidistant levels in log scale (2 per decade), starting from 10^{-2} muons/m^2.

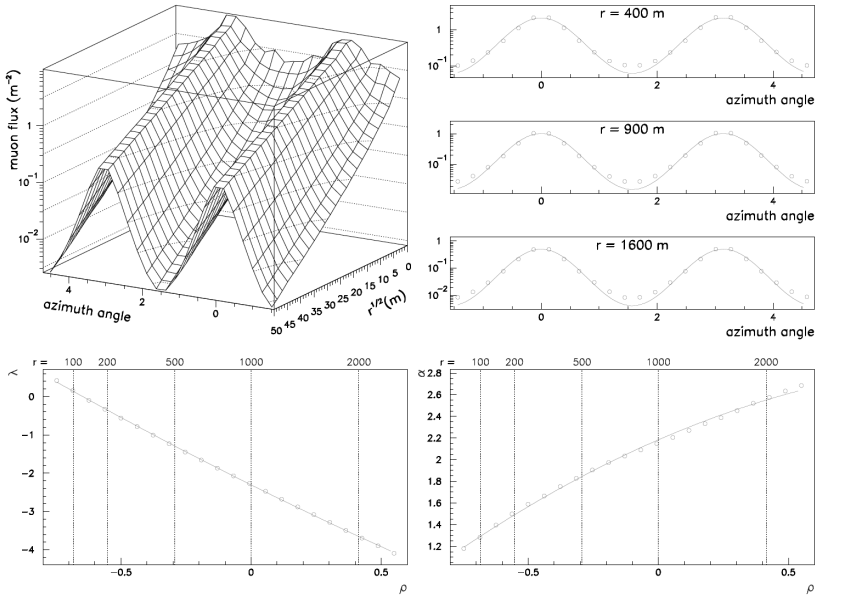
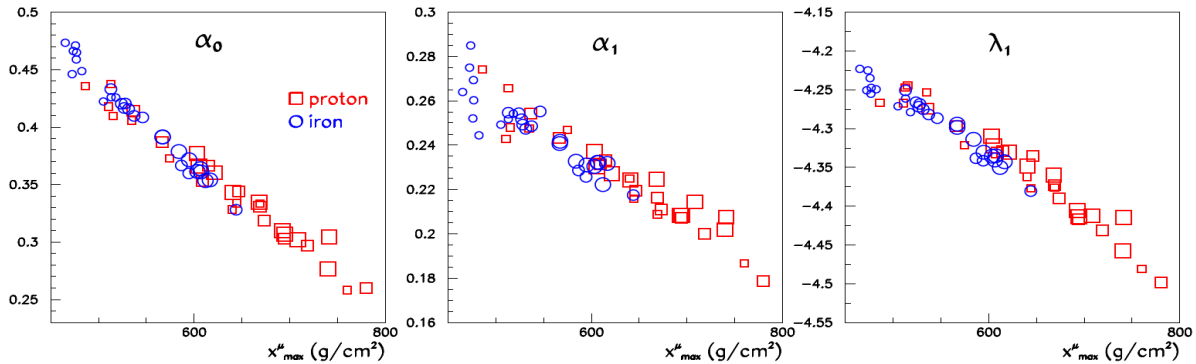


Figure 7: Parametrization of the muon density in (r, ψ) coordinates, for a proton shower at 10 EeV, $\theta = 80$ deg, $B_t = 60$ μT (same organisation as Fig. 6).

$$f(r,\psi) = \exp\left(\lambda(\rho) + \alpha(\rho)\cos(2(\psi - \psi_B)) + \beta(\rho)\cos(\psi)\right)$$

$$\rho = \sqrt{r/r_{\rm ref} - 1}$$

dependence on X^{μ}_{max}



$$\lambda(\rho) = \lambda_0 + \lambda_1\rho + \lambda_2\rho^2$$
$$\alpha(\rho) = \alpha_0 + \alpha_1\rho + \alpha_2\rho^2$$

QGSJET II-04

proton iron

θ = 72 deg

0.1 / 1 / 10 EeV

discrimination between models

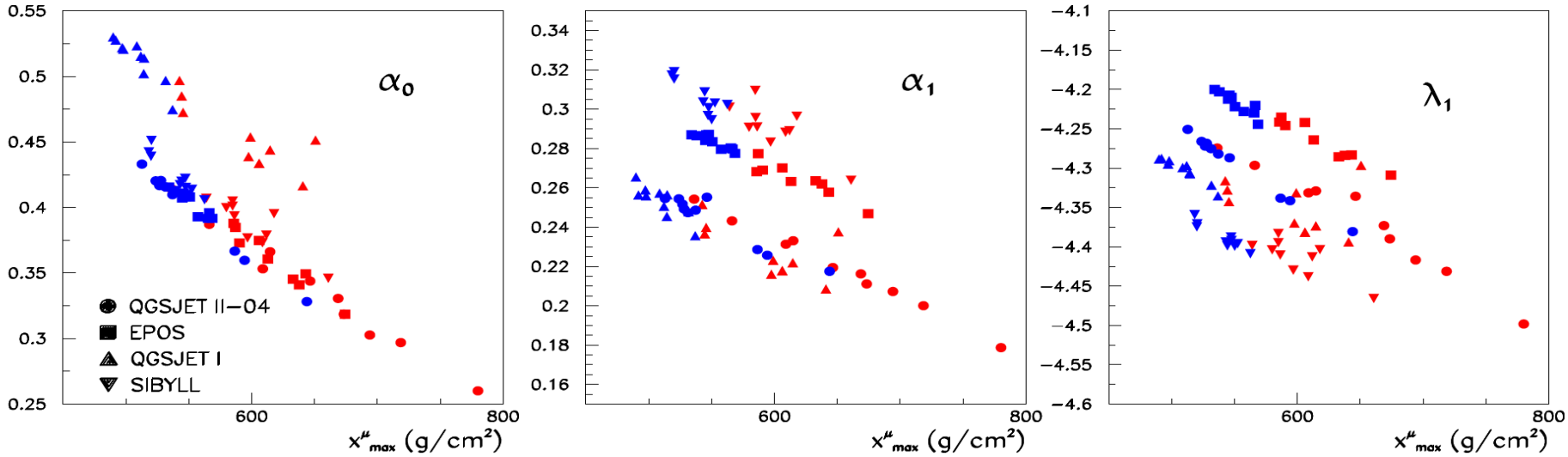
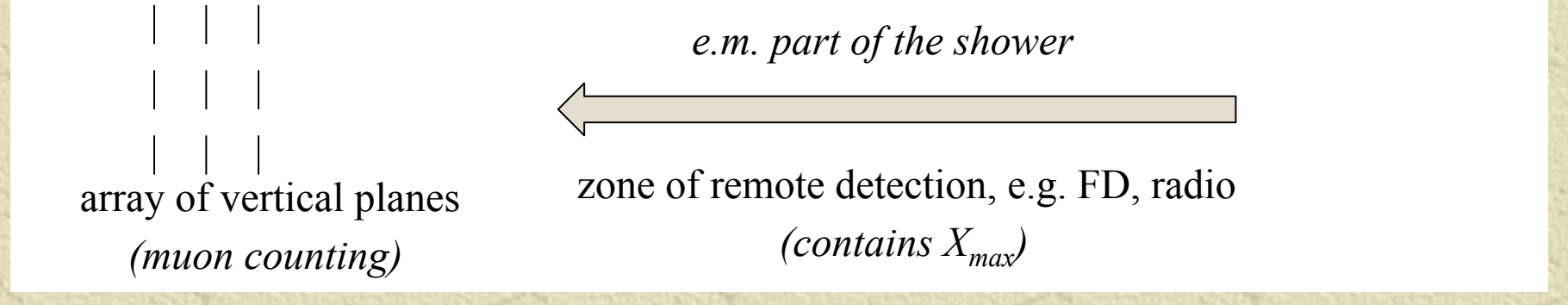


Figure 12: Dependence of the shape parameters on $X^{\mu}_{\max}$ at $E = 1$ EeV, $\theta = 72$ deg, $B_t = 30$ μT, for different hadronic models. Blue symbols are for iron, red ones for proton.

suggested insertion within a large surface detector



additional information to be exploited: time structure ?