On the possible method of identification of two probably cognate Extensive Air Showers

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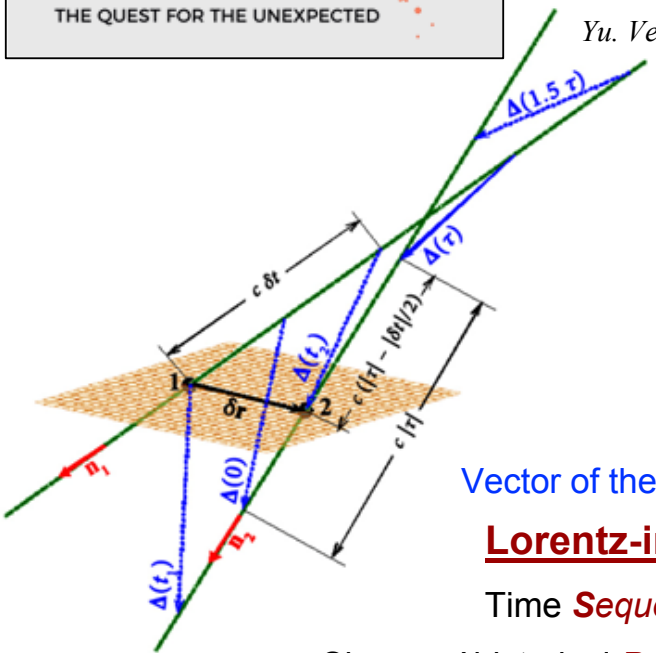

Radius-vectors of two showers' cores observation points with their covariance matrices: $\mathbf{r}_{01},\ \mathbf{r}_{02};\quad \delta\mathbf{r}=\mathbf{r}_{02}-\mathbf{r}_{01}$; $\mathbf{M}_1,\ \mathbf{M}_2;\quad \mathbf{M}=\mathbf{M}_1+\mathbf{M}_2$

The times of those showers' observations with their dispersions: $\hat{t}_{01},\ \hat{t}_{02};\quad \delta t=\hat{t}_{02}-\hat{t}_{01}$; $\sigma^2_{t1},\ \sigma^2_{t2};\quad \sigma^2_{\delta t}=\sigma^2_{t1}+\sigma^2_{t2}$

Unit vectors of the showers fronts' motion directions with their covariance matrices: $\mathbf{n}_1,\ \mathbf{n}_2;\quad \delta\mathbf{n}=\mathbf{n}_2-\mathbf{n}_1;\quad \langle\mathbf{n}\rangle=(\mathbf{n}_1+\mathbf{n}_2)/2$; $\mathbf{D}_1,\ \mathbf{D}_2;\quad \mathbf{D}=\mathbf{D}_1+\mathbf{D}_2;\quad \mathbf{D}/4$

Variable vector connecting two moving showers' ancestors $\boldsymbol{\Delta}(t)=\left[\delta\mathbf{r}-\langle\mathbf{n}\rangle(c\,\delta t)\right]+(c\,\delta\mathbf{n})\cdot t$

Time instant of the closest approach of the showers' ancestors $\tau=-(1/c)(\delta\mathbf{r}^{\mathrm{T}}\delta\mathbf{n})/(\delta\mathbf{n}^{\mathrm{T}}\delta\mathbf{n})$

Vector of the closest approach of the showers' ancestors $\boldsymbol{\Delta}=\boldsymbol{\Delta}(\tau)=\delta\mathbf{r}-(c\,\delta t)\cdot\langle\mathbf{n}\rangle-\left((\delta\mathbf{r}^{\mathrm{T}}\delta\mathbf{n})/(\delta\mathbf{n}^{\mathrm{T}}\delta\mathbf{n})\right)\cdot\delta\mathbf{n}$

Lorentz-invariant verifying parameters:

Time ***Sequencing*** parameter $S=\operatorname{arsinh}\left(c\left(\tau+|\delta t|/2\right)/|\delta\mathbf{r}|\right)$

Showers' historical ***Proximity*** parameter $P=-\ln\left(|\Delta|/\left(k\cdot\sigma_{\Delta}\right)\right)$

Combined verifying criterion of possible historical proximity of both observed showers

$$K=\frac{2}{\pi}\Psi=\frac{2}{\pi}\operatorname{arctg}\left(\frac{S}{P}\right)$$