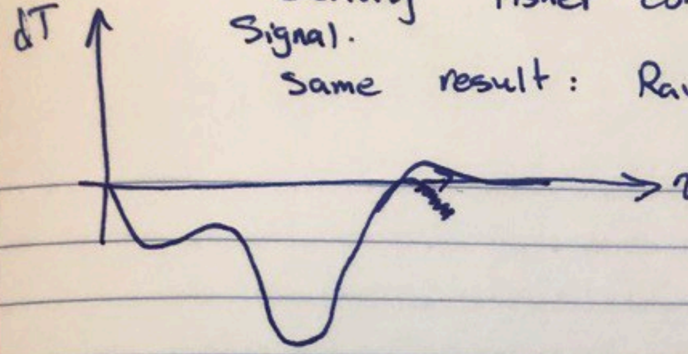
Deriving Fisher components for Global Signal.

Same result: Raul Monsalve Memo 165



Gaussian Likelihood assuming $\sigma_{(\nu_n)} = \sigma$

$$L_{(\nu_n)} = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{ - \frac{\left(T_{(\theta)} - T_{fid(\nu)}\right)^2}{2\sigma^2} \right\}$$

$$\mathrm{Log}\, L_T = \mathrm{Log} \prod_{\{n\}} L_{(\nu_n)}$$

$$= \sum_n \log L_{(\nu_n)}$$

$$= \sum_{n=1}^{N} \frac{-1}{2} \log(2\pi\sigma^2) - \frac{\left(T_{(\theta)} - T_{fid}\right)^2}{2\sigma^2}$$

$$\log L_T = LL$$

$$F_{ij} = - \frac{\partial LL}{\partial\theta_i \partial\theta_j} \qquad T = T(\{\theta_i\})$$

$$F_{ij} = \frac{-\partial}{\partial\theta_i} \sum_n 0 - \frac{1}{\cancel{2}\sigma^2} \cdot \cancel{2} \cdot (T - T_{fid}) \frac{\partial T}{\partial\theta_j}$$

$$= \frac{1}{\sigma^2} \sum_n \frac{\partial T}{\partial\theta_i} \frac{\partial T}{\partial\theta_j} + (T - T_{fid}) \frac{\partial^2 T}{\partial\theta_i \partial\theta_j}$$

bc we are evaluating the derivatives @ fiducial values the second term is zero.

$$\Rightarrow \quad F_{ij} = \frac{1}{\sigma^2} \sum_{n=1}^{N} \frac{\partial T_{(\nu_n)}}{\partial\theta_i} \frac{\partial T_{(\nu_n)}}{\partial\theta_j}$$

General Case $\sigma = \sigma_{(\nu_n)}$

$$F_{ij} = \sum_{n=1} \frac{1}{\sigma_{(\nu_n)}^2} \frac{\partial T_{(\nu_n)}}{\partial\theta_i} \frac{\partial T_{(\nu_n)}}{\partial\theta_j}$$