Fit di curve

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Tesi di laurea triennale in Fisica
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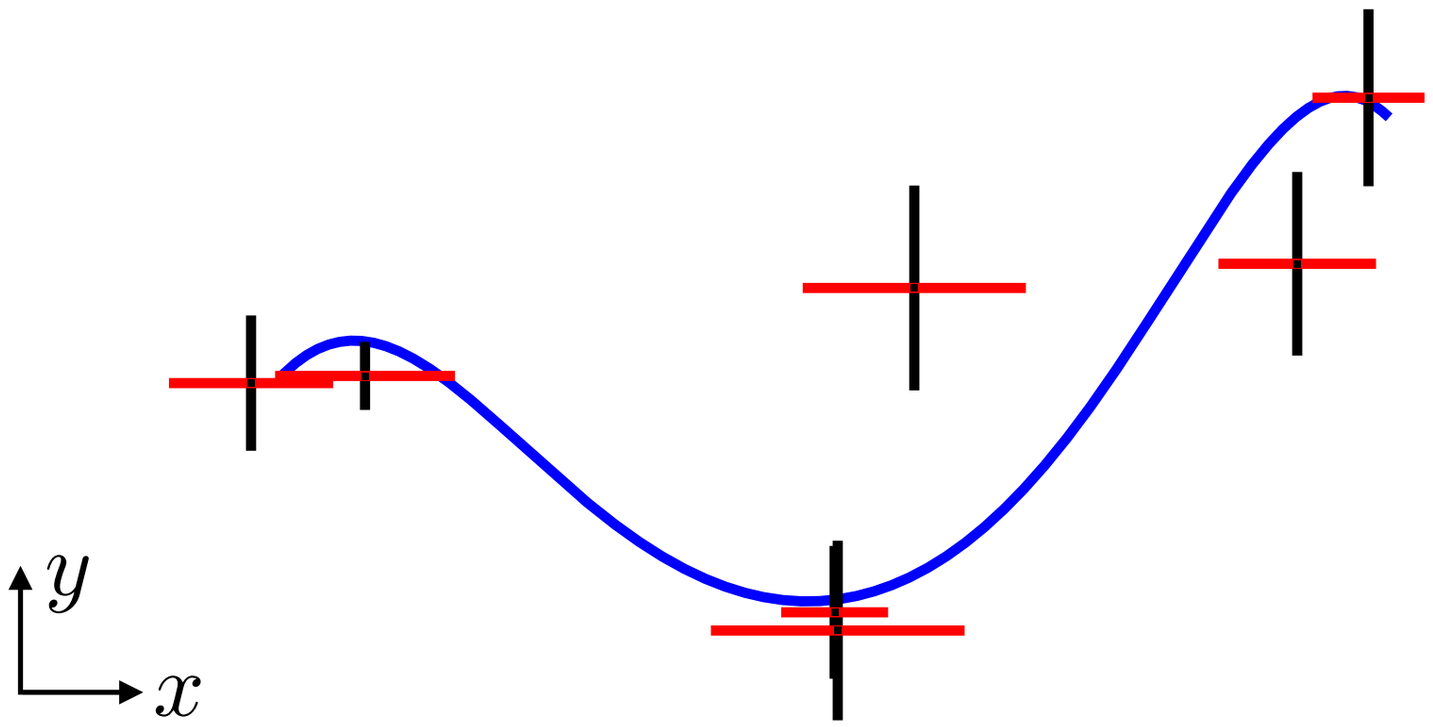
Pisa 2017-09-21



$$y = f(x, \boldsymbol{\beta})$$

$$\mathcal{L}(\boldsymbol{\theta}) = P(\text{dati} \,|\, \text{parametri } \boldsymbol{\theta})$$

$$\hat{\boldsymbol{\theta}} : \ \boldsymbol{\theta} \text{ che massimizza } \mathcal{L}(\boldsymbol{\theta})$$

$$\mathcal{L}(\boldsymbol{\beta}, \bar{\mathbf{x}}) = P(\mathbf{x}, \mathbf{y} | \boldsymbol{\beta}, \bar{\mathbf{x}}) =$$

$$= \prod_i \text{gauss2D} \begin{pmatrix} x_i & \bar{x}_i & \Delta x_i \\ y_i \,, & f(\bar{x}_i, \boldsymbol{\beta}) \,, & \Delta y_i \end{pmatrix}$$

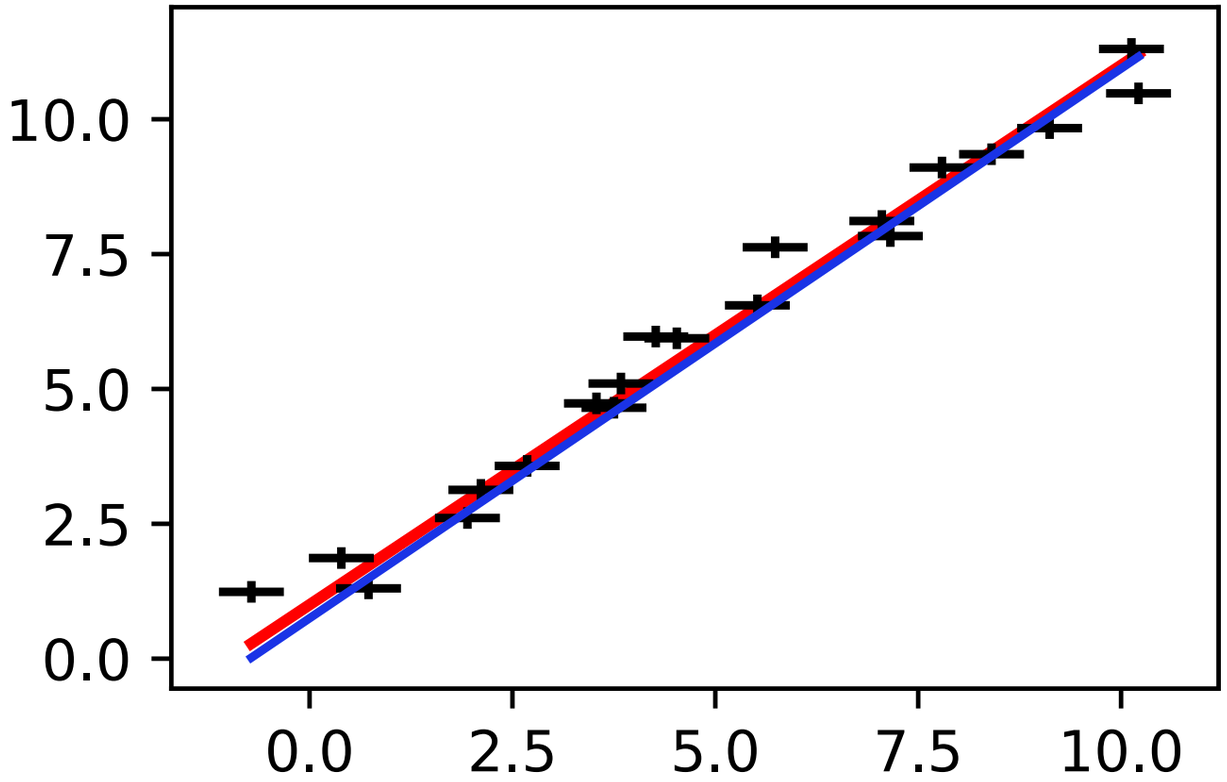
“Varianza efficace”

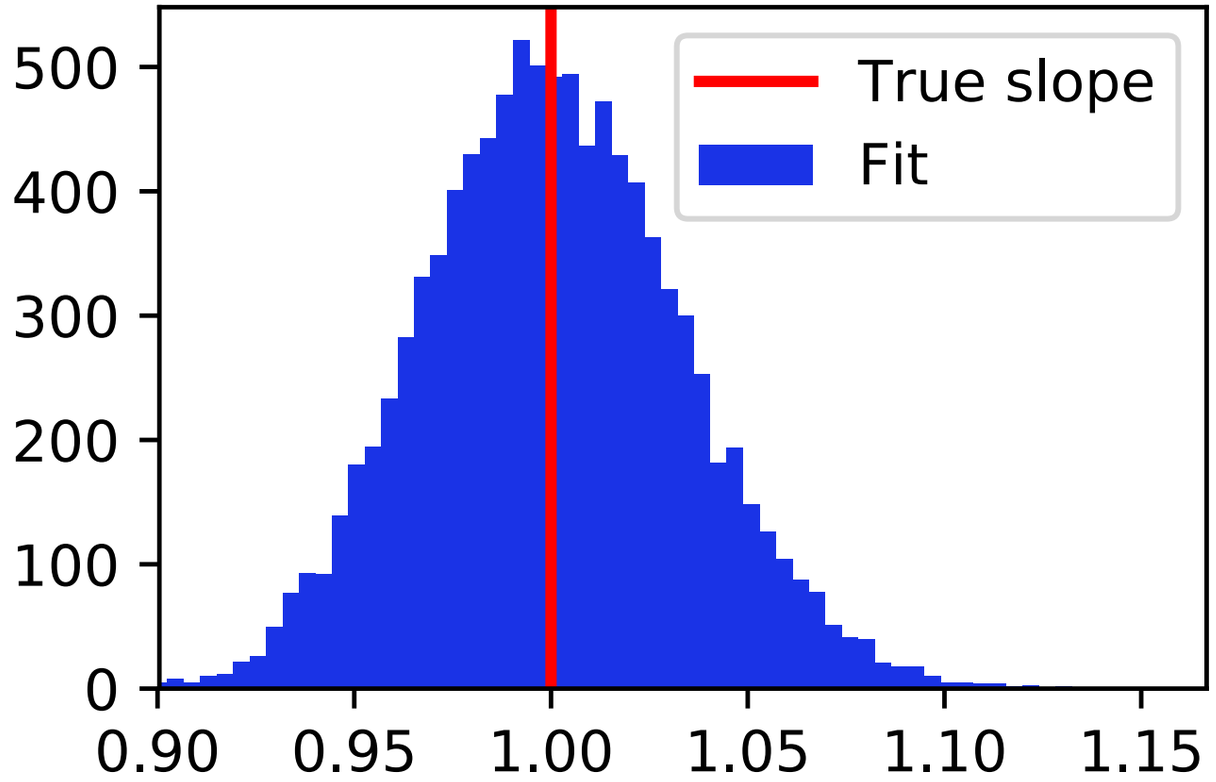
- ignoro Δx e ottengo $\boldsymbol{\beta}_0$
- sostituisco $\Delta y \mapsto \Delta y \oplus \frac{\mathrm{d}f}{\mathrm{d}x}(x, \boldsymbol{\beta}_i)\Delta x$
  e ottengo $\boldsymbol{\beta}_{i+1}$

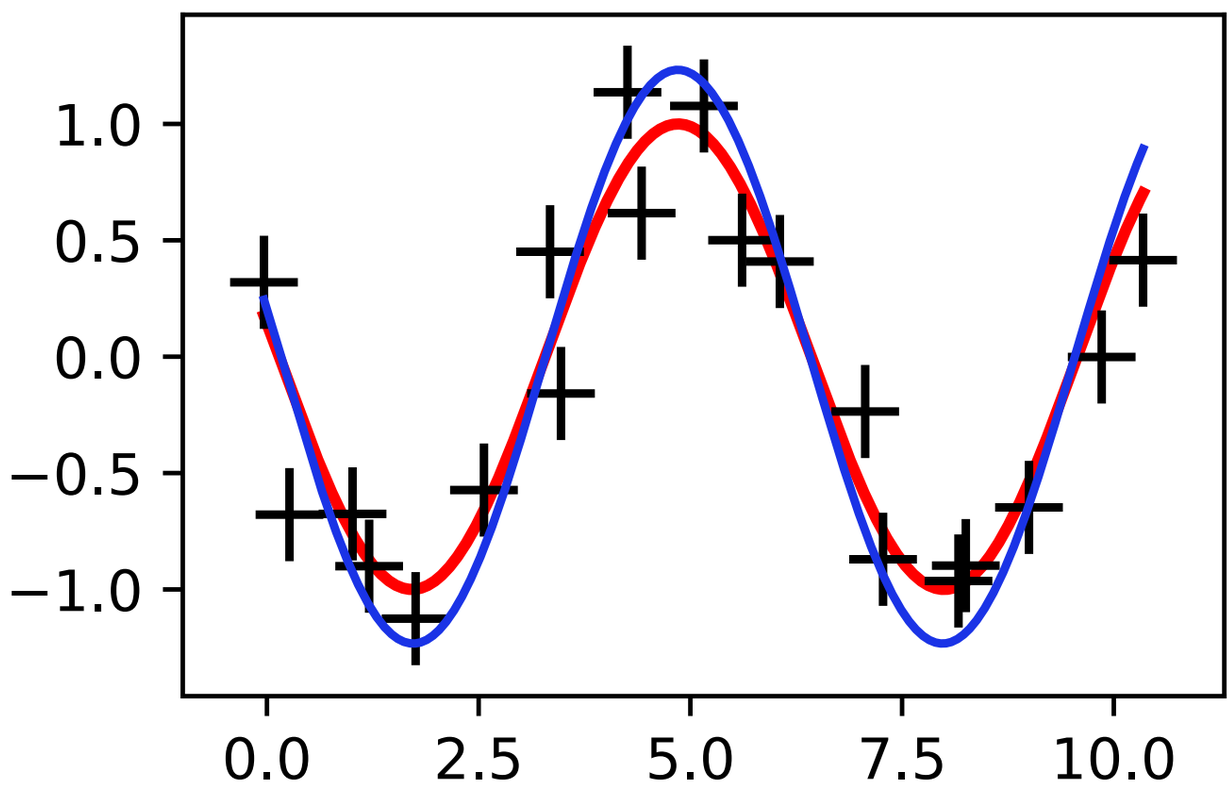
“Regressione ortogonale”

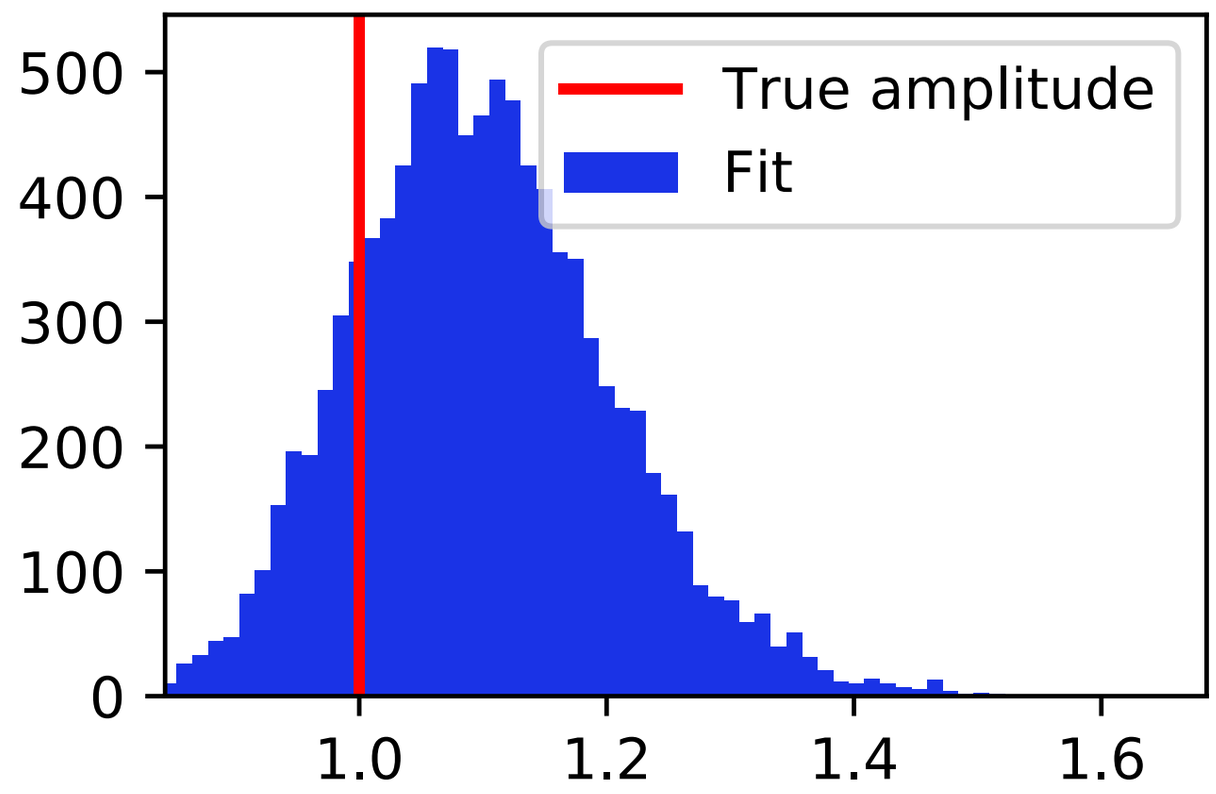
$$\mathrm{gauss2D}(\ldots) \mapsto$$

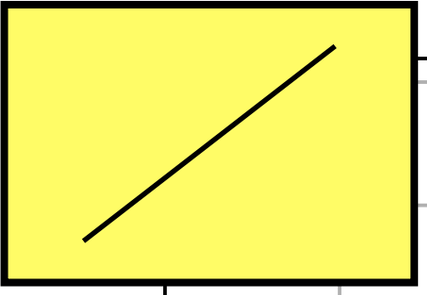
$$\mapsto \mathrm{gauss1D}\left(y, f(x, \boldsymbol{\beta}), \Delta y \oplus \frac{\mathrm{d}f}{\mathrm{d}x}(x, \boldsymbol{\beta})\Delta x\right)$$


10.0
7.5
5.0
2.5
0.0
0.0
2.5
5.0
7.5
10.0

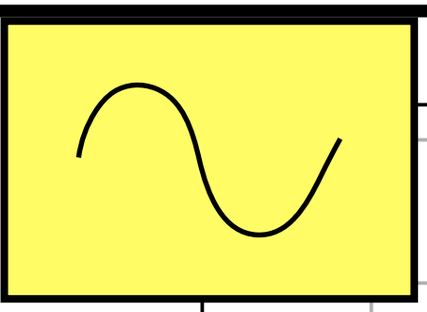

500
400
300
200
100
0
0.90
0.95
1.00
1.05
1.10
1.15
True slope
Fit


1.0
0.5
0.0
−0.5
−1.0
0.0
2.5
5.0
7.5
10.0


500
400
300
200
100
0
1.0
1.2
1.4
1.6
True amplitude
Fit



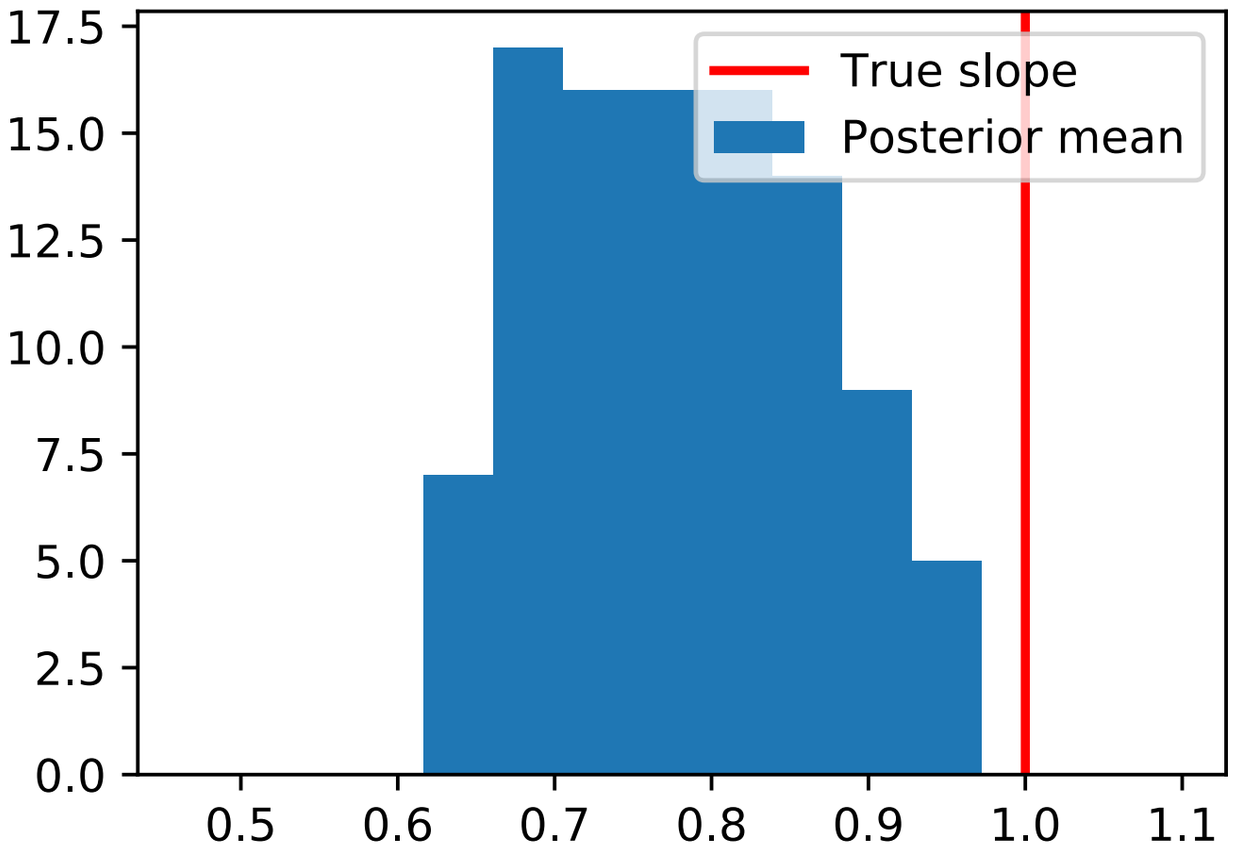
1.0
0.9
0.8
0.7
True slope
Δy
Ignore Δx
Effective variance
Maximum likelihood
10^{-1}
10^{0}

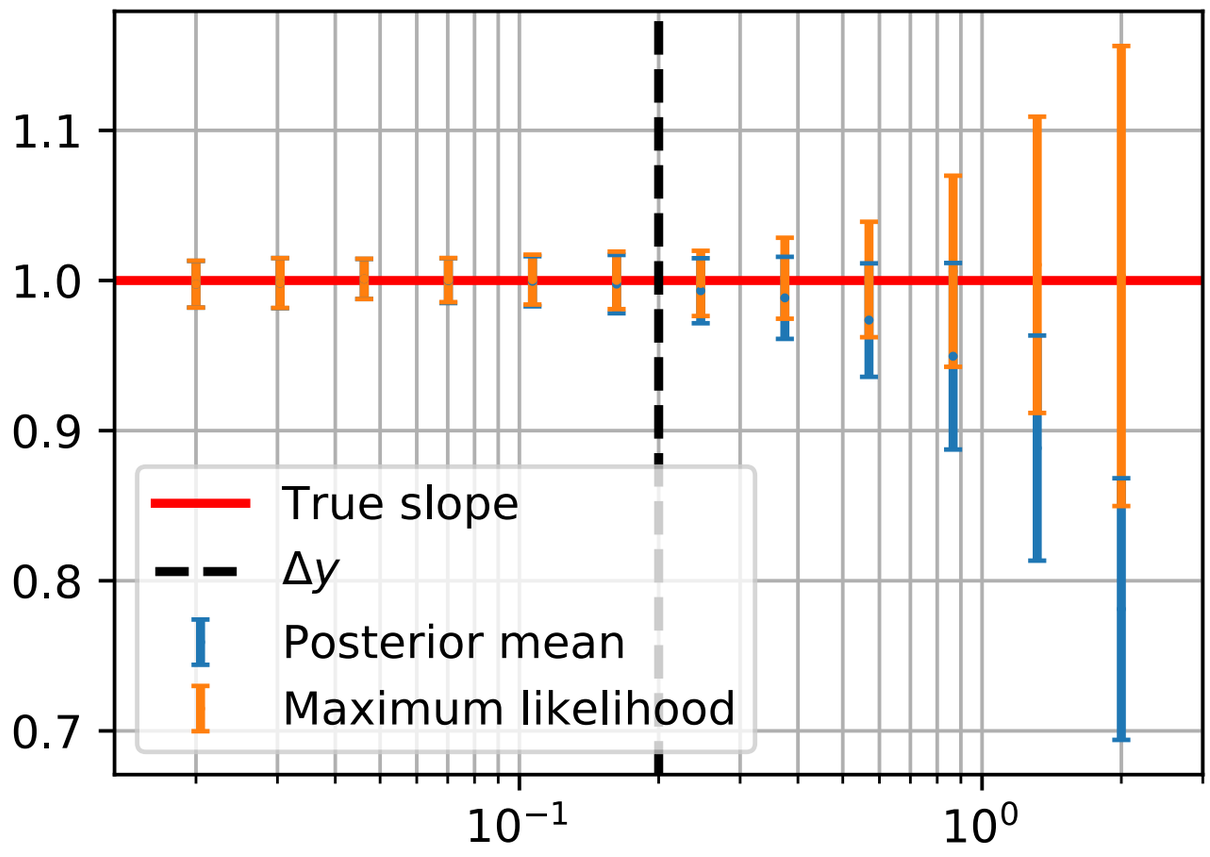


1.0
0.5
0.0
−0.5
True amplitude
Δy
Ignore Δx
Orthogonal distance
Maximum likelihood
10^{-1}
10^{0}

Teorema di Bayes

$$P(\boldsymbol{\theta}|\text{dati}) = \frac{P(\text{dati}|\boldsymbol{\theta}) \cdot P(\boldsymbol{\theta})}{P(\text{dati})}$$





fine

Conti fatti con lab.py github.com/Gattocrucco/lab