ARE THERE APPLICATIONS FOR LAPLACIAN STATS IN U-PB DATA INTERPRETATION?

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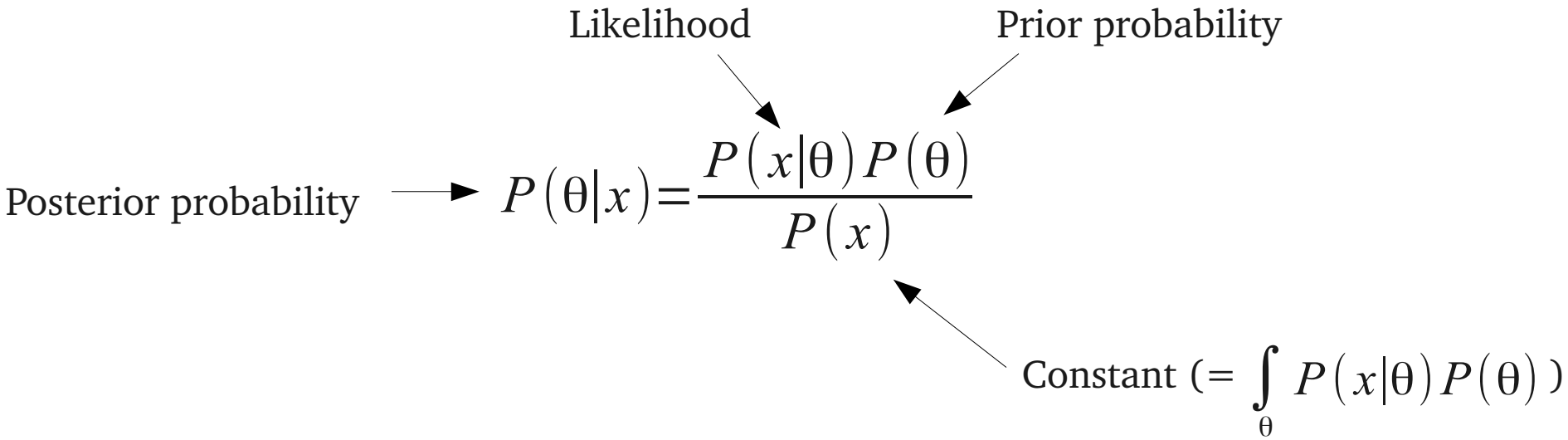
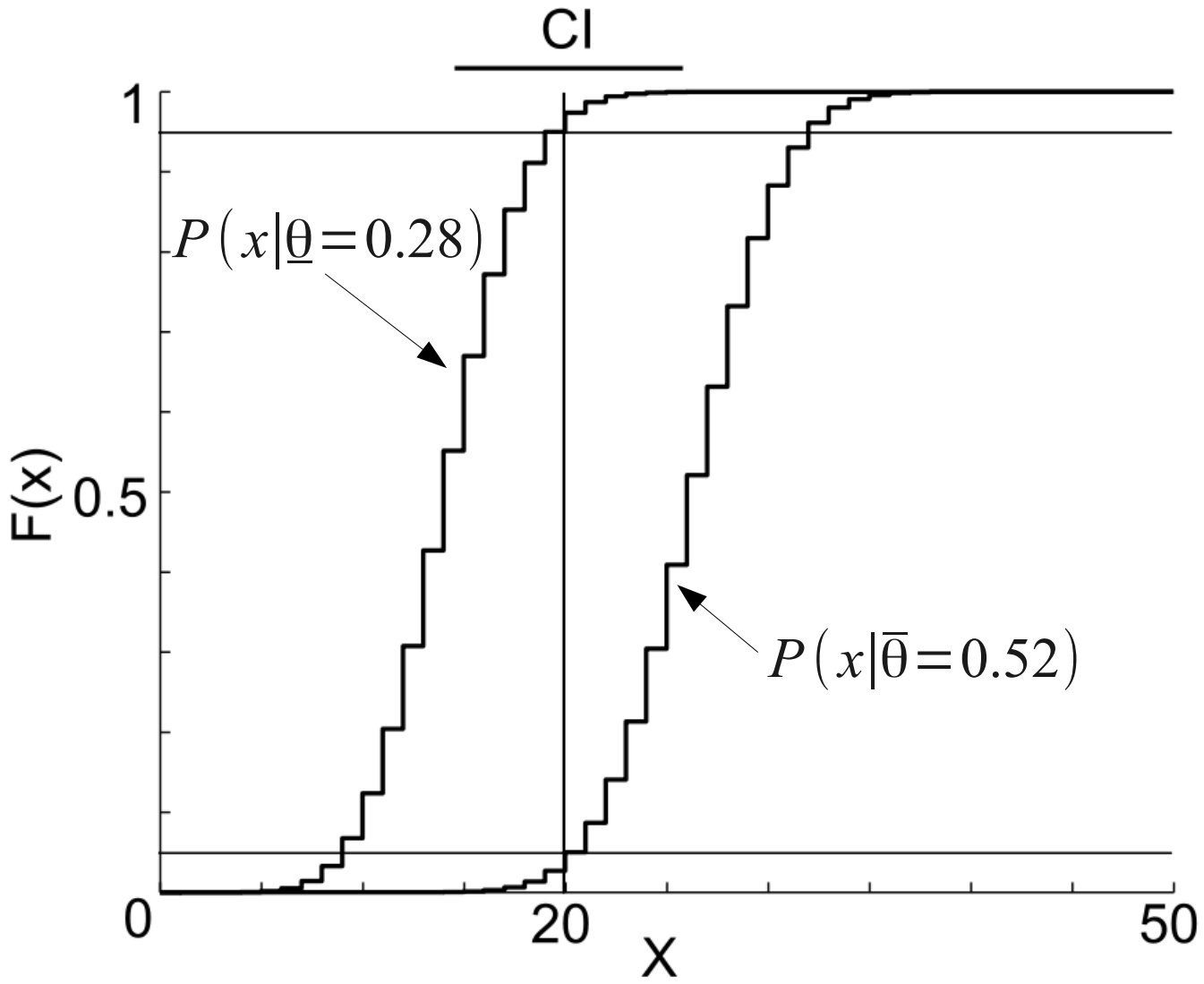
Thomas Bayes (1701 – 1761)

Pierre-Simon Laplace (1749–1827)


Likelihood
Prior probability
Posterior probability
$P(\theta|x) = \frac{P(x|\theta)P(\theta)}{P(x)}$
Constant $(= \int_{\theta} P(x|\theta)P(\theta))$

Binomial

$$P(\theta|x)=\frac{P(x|\theta)P(\theta)}{P(x)}$$

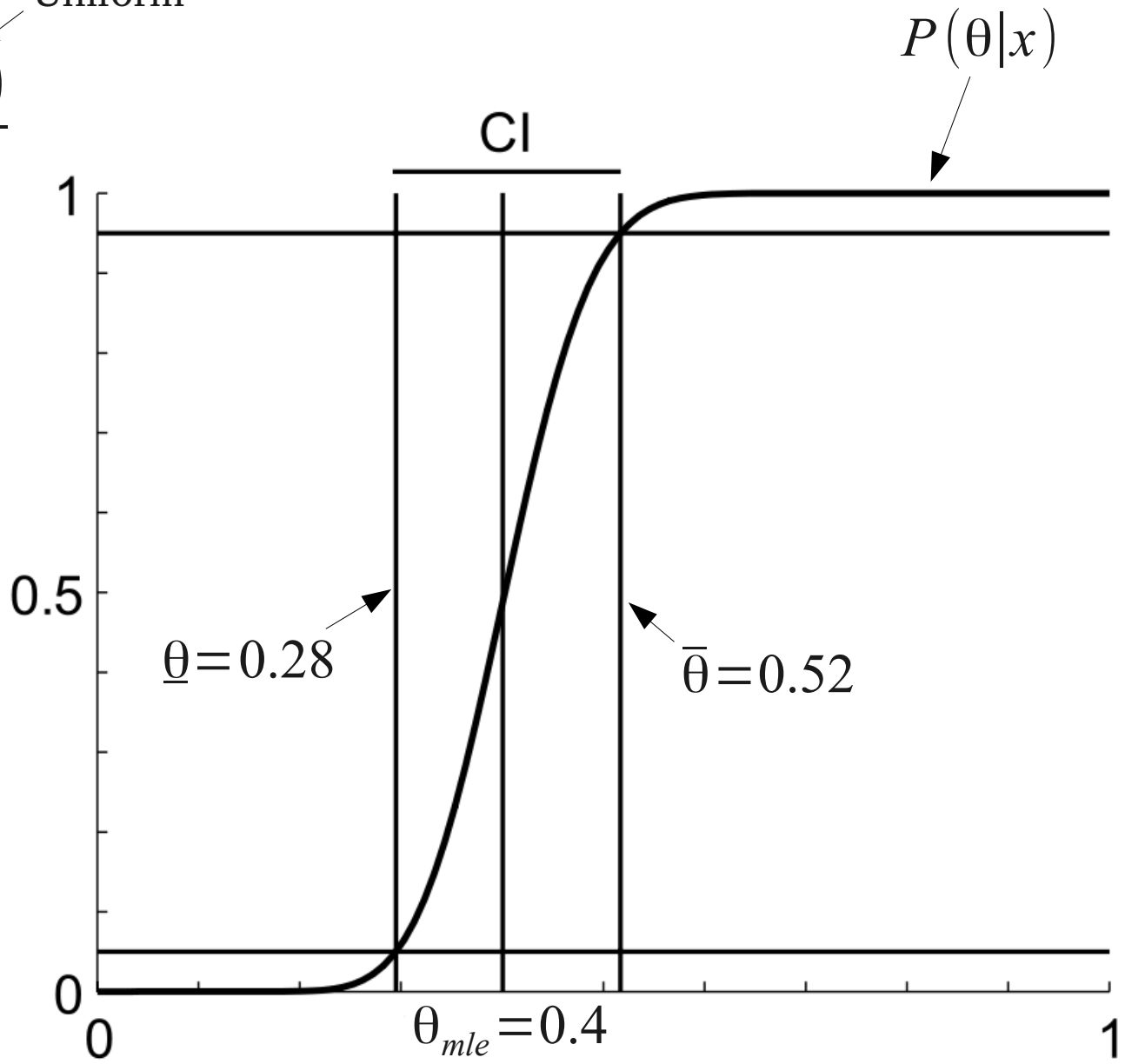


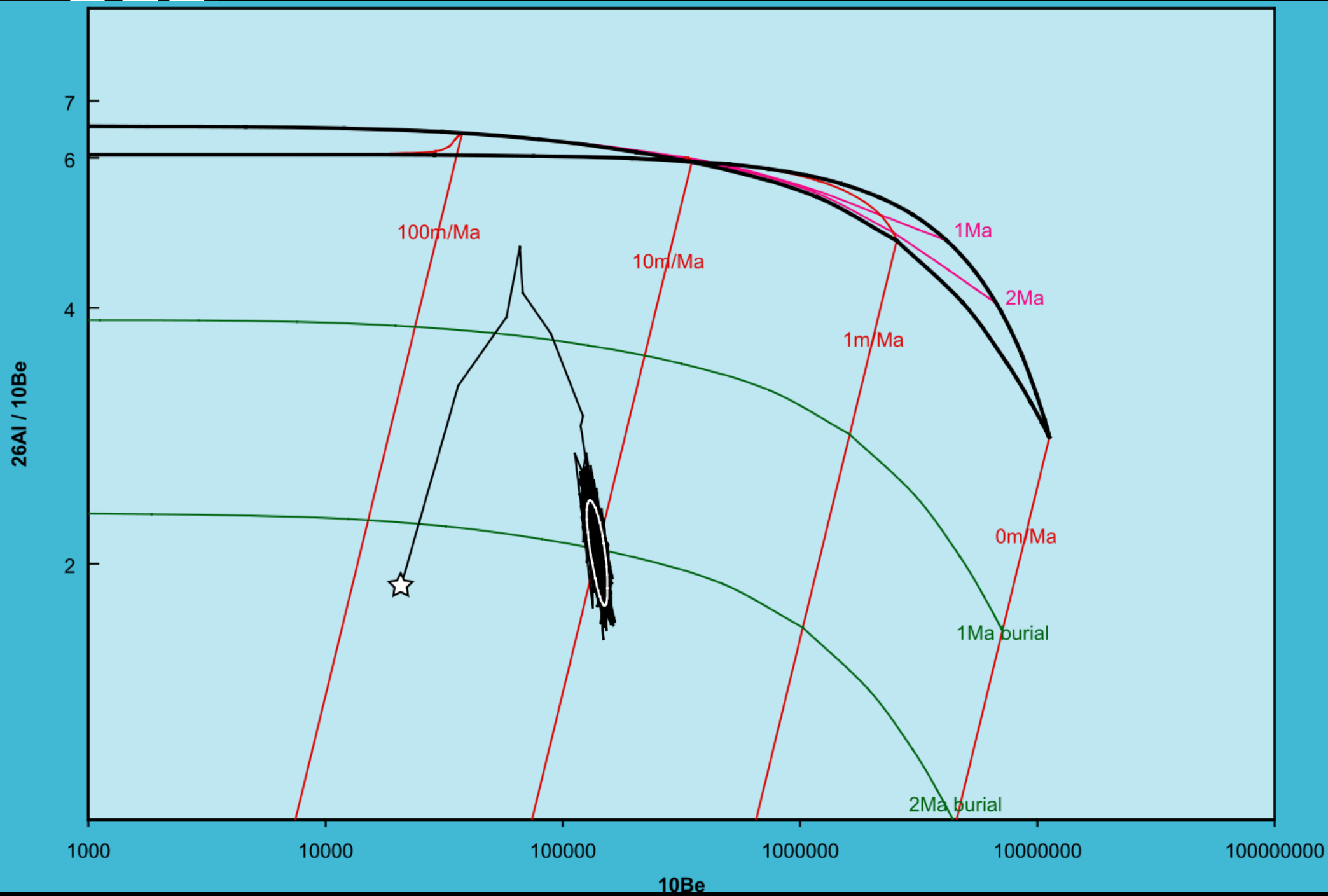
$$P(\theta|x) = \frac{P(x|\theta_{mle})\,P(\theta)}{P(x)}$$

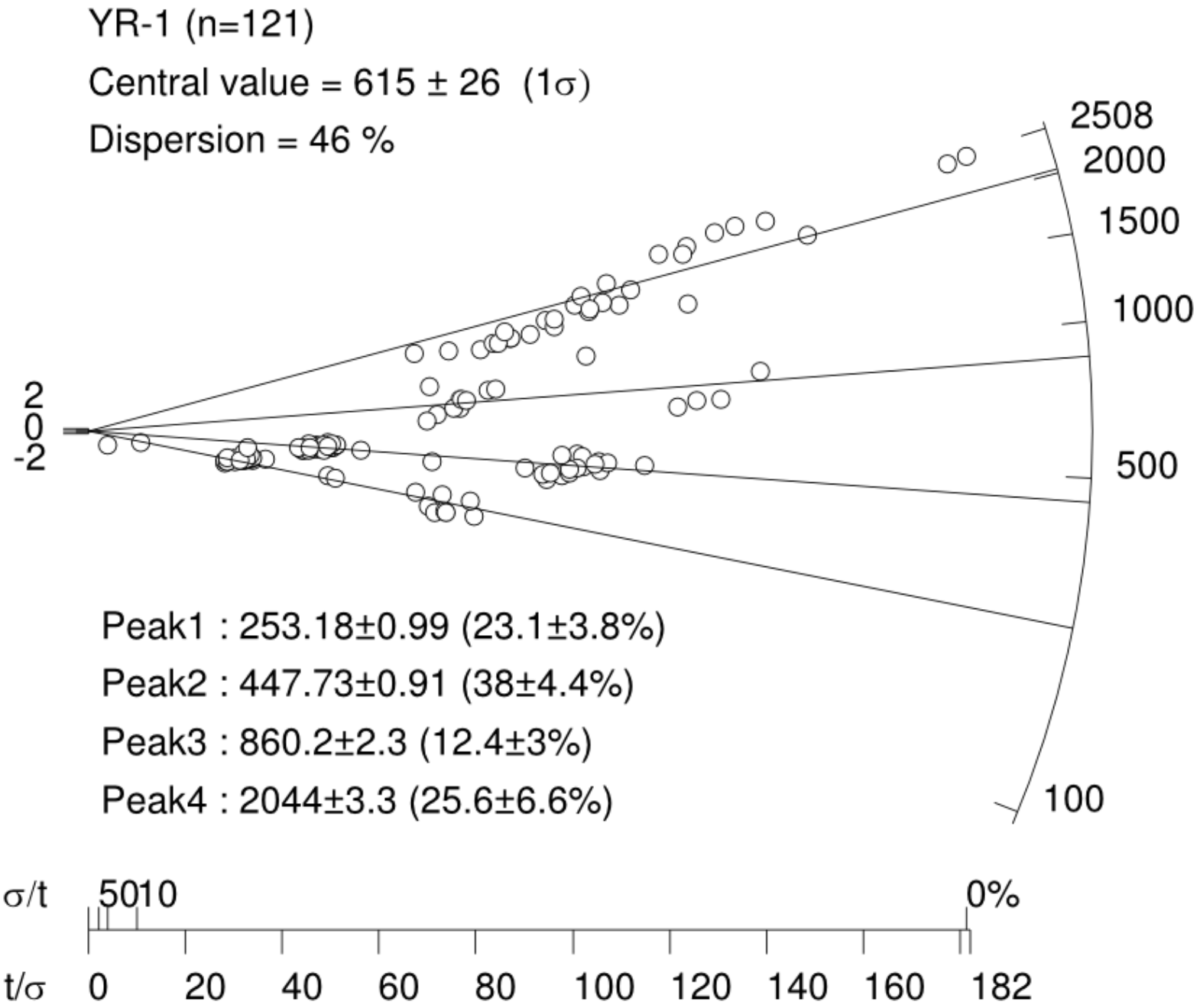
Binomial

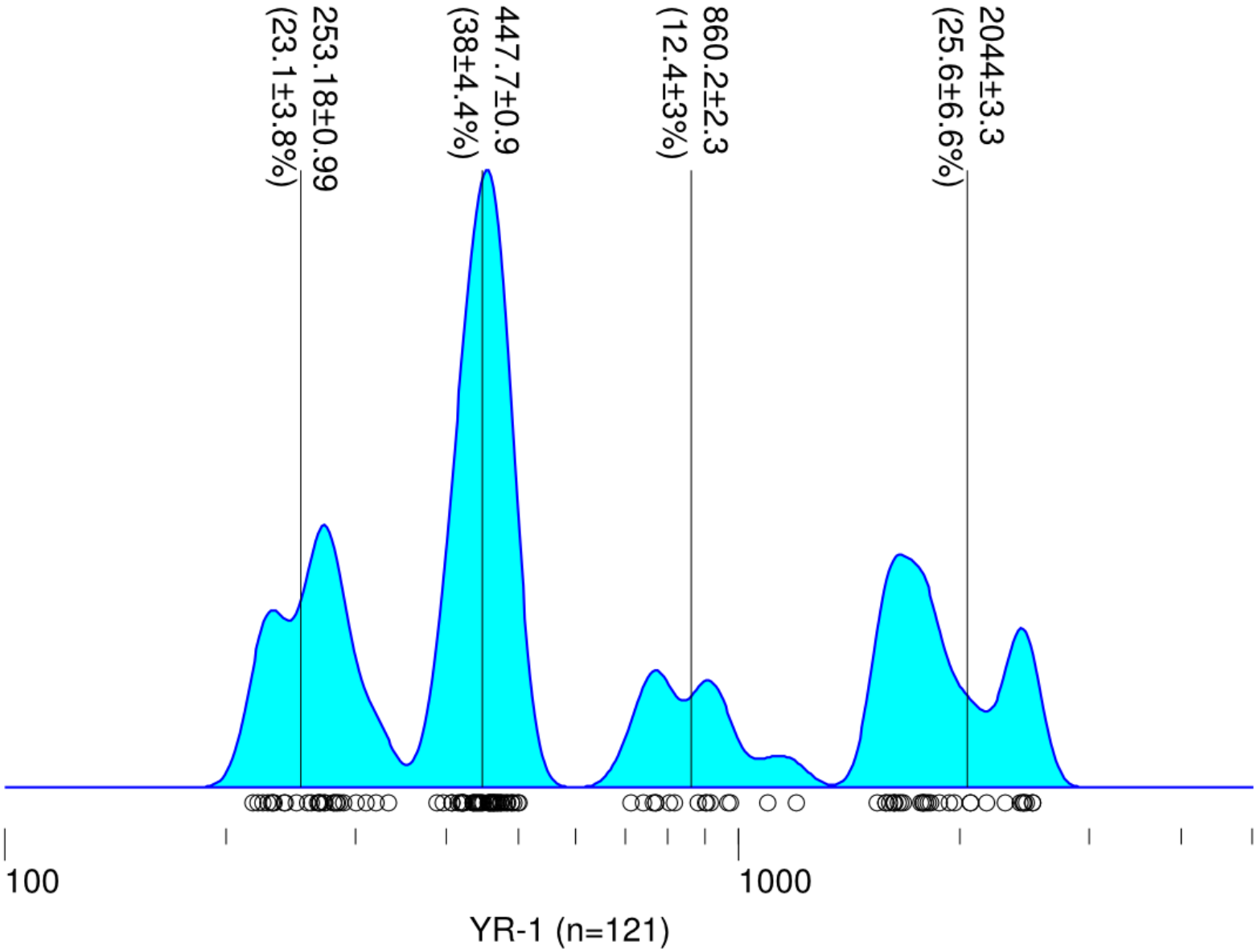
Uniform

Beta




7
6
4
2
26Al / 10Be
100m/Ma
10m/Ma
1m/Ma
1Ma
2Ma
0m/Ma
1Ma burial
2Ma burial
1000
10000
100000
1000000
10000000
100000000
10Be


YR-1 (n=121)
Central value = 615 ± 26 (1σ)
Dispersion = 46 %
2508
2000
1500
1000
500
100
2
0
-2
Peak1 : 253.18±0.99 (23.1±3.8%)
Peak2 : 447.73±0.91 (38±4.4%)
Peak3 : 860.2±2.3 (12.4±3%)
Peak4 : 2044±3.3 (25.6±6.6%)
σ/t
5010
0%
t/σ
0
20
40
60
80
100
120
140
160
182


253.18±0.99
(23.1±3.8%)
447.7±0.9
(38±4.4%)
860.2±2.3
(12.4±3%)
2044±3.3
(25.6±6.6%)
100
1000
YR-1 (n=121)

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Bayesian Mixture Modelling in Geochronology via Markov Chain Monte Carlo[1]

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