

ORCA4 oscillation analysis

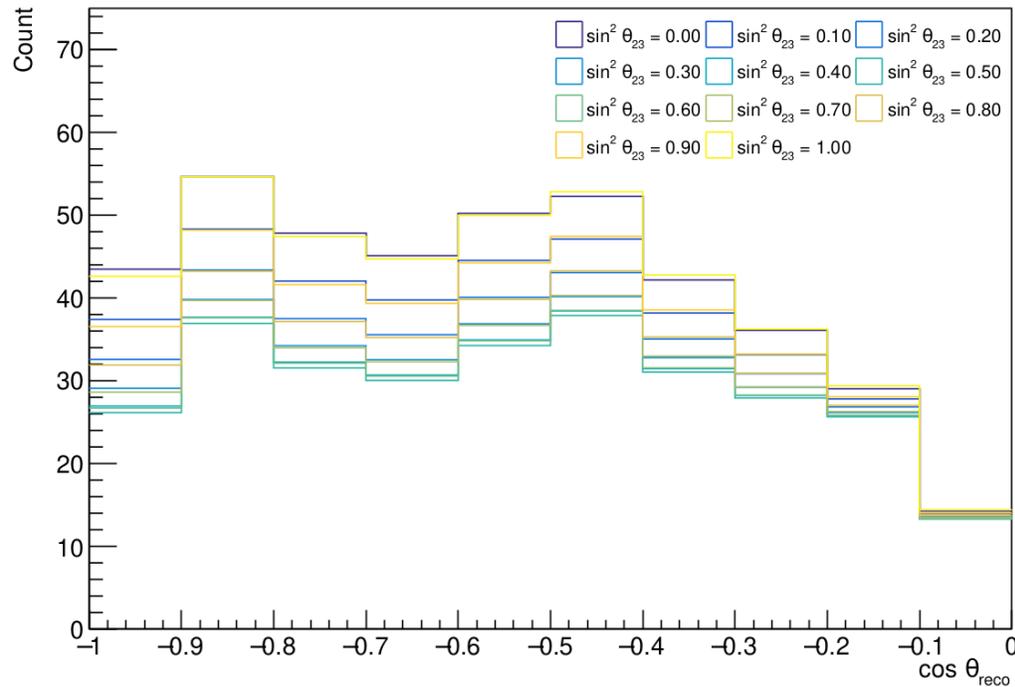
Lodewijk Nauta

Nikhef

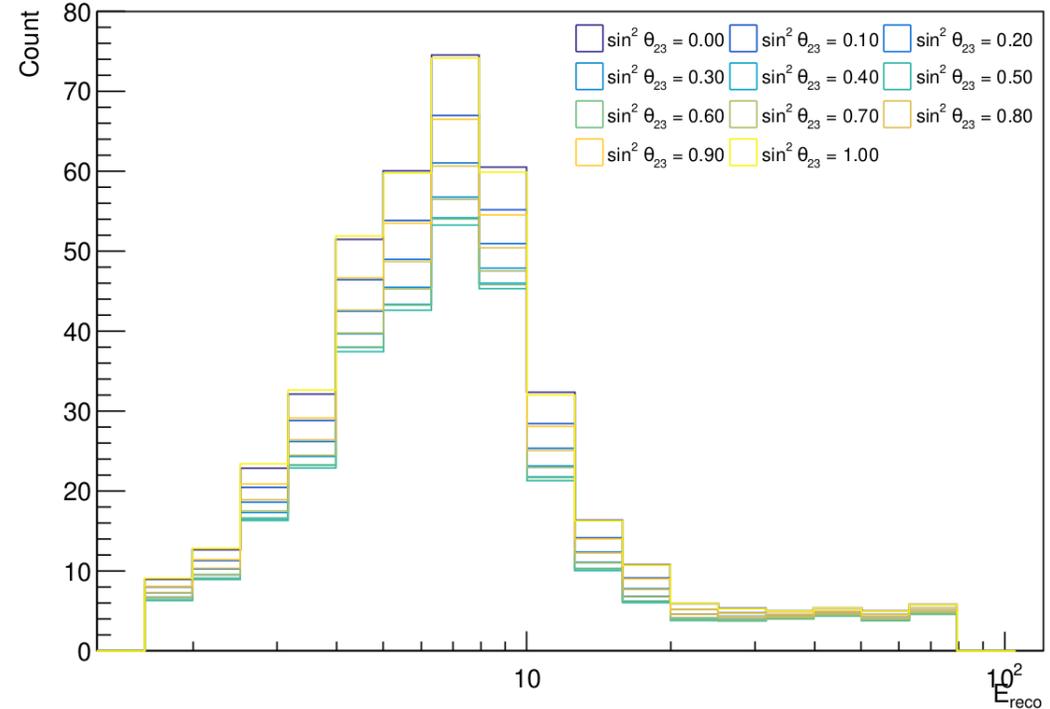
2020-12-10

Th23 parameter space

Event distribution [ORCA4 133 days]



Event distribution [ORCA4 133 days]



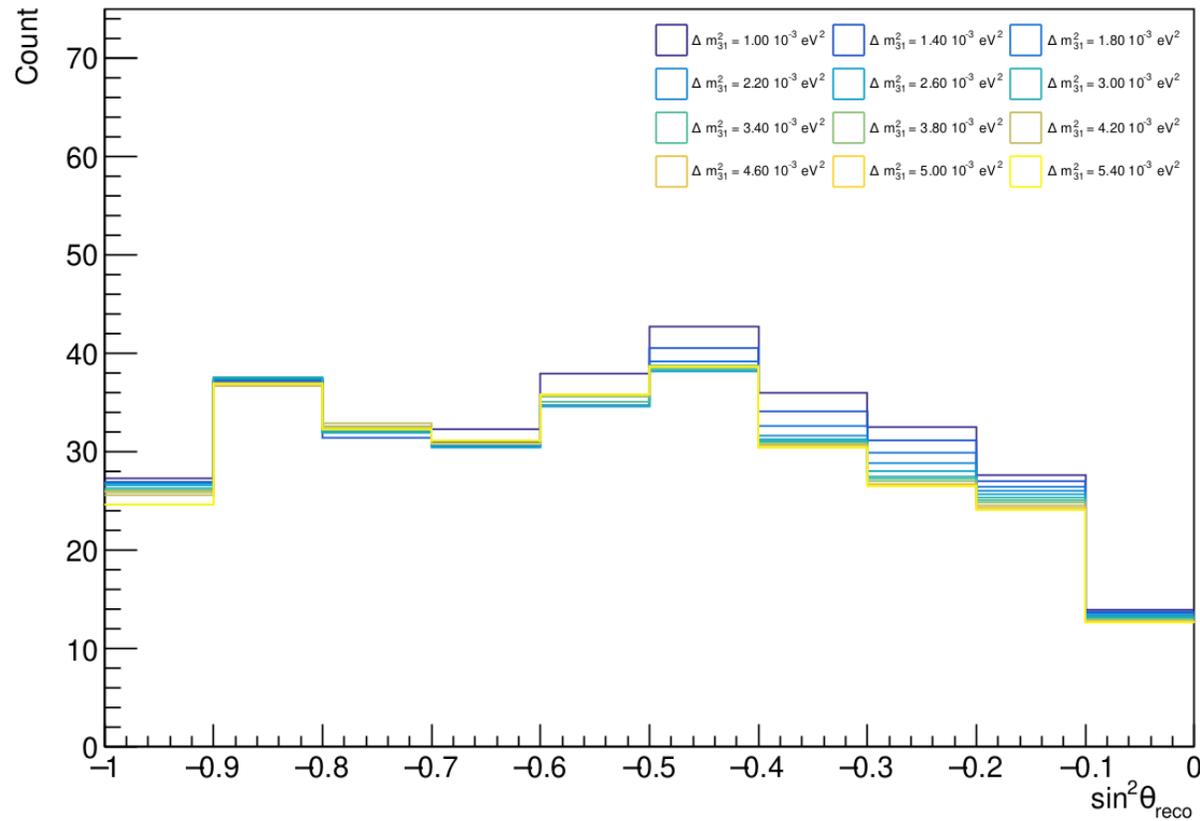
NB: Results are given in terms of $\sin^2(\theta_{23})$, consistent with nu-fit and PDG.

Oscillation probability depends on $\sin^2(2\theta_{23})$:

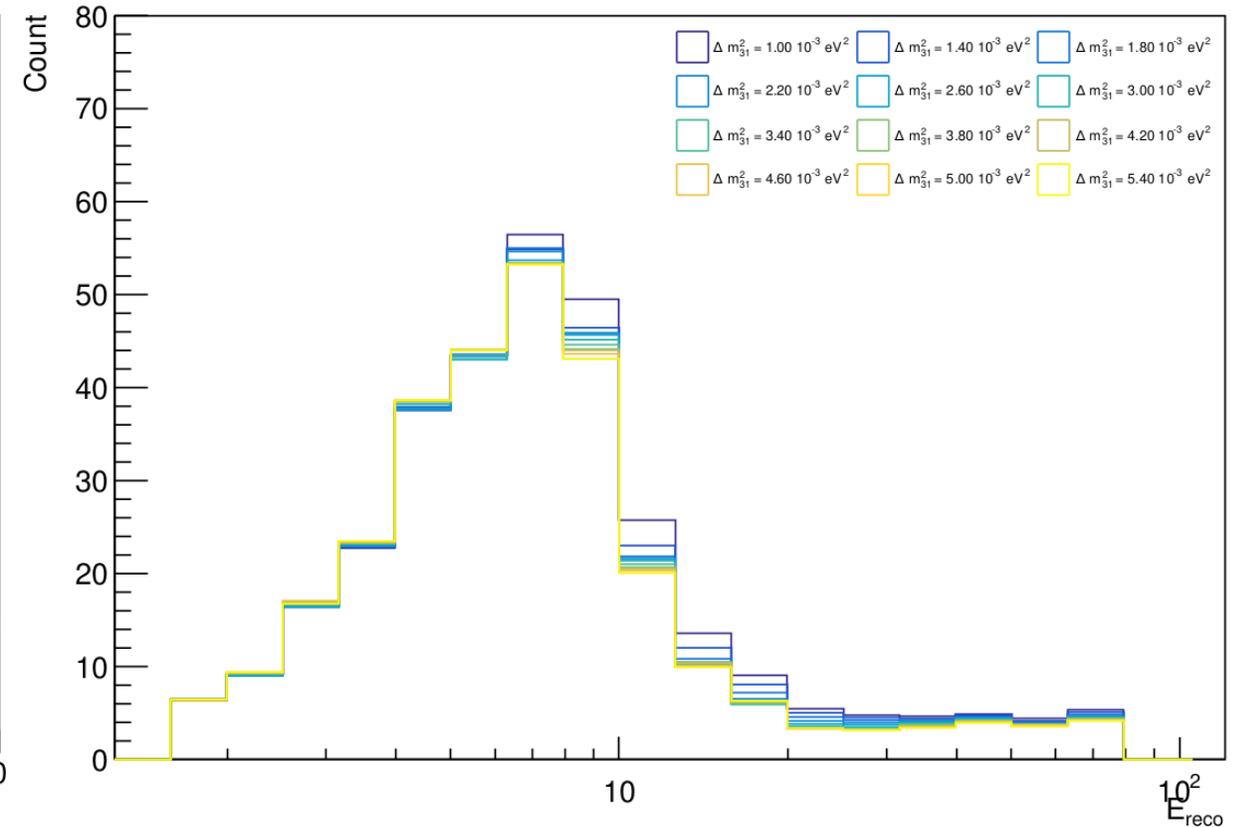
$$P_{\nu_{\mu} \rightarrow \nu_{\mu}} \approx 1 - \sin^2 2\theta_{\mu\mu} \sin^2 \frac{\Delta m_{\mu\mu}^2 L}{4E_{\nu}} \approx 1 - \cos^2 \theta_{13} \sin^2(2\theta_{23}) \sin^2 \frac{\Delta m_{32}^2 L}{4E_{\nu}} + \mathcal{O}(\alpha, s_{13}^2)$$

Dm31² parameter space

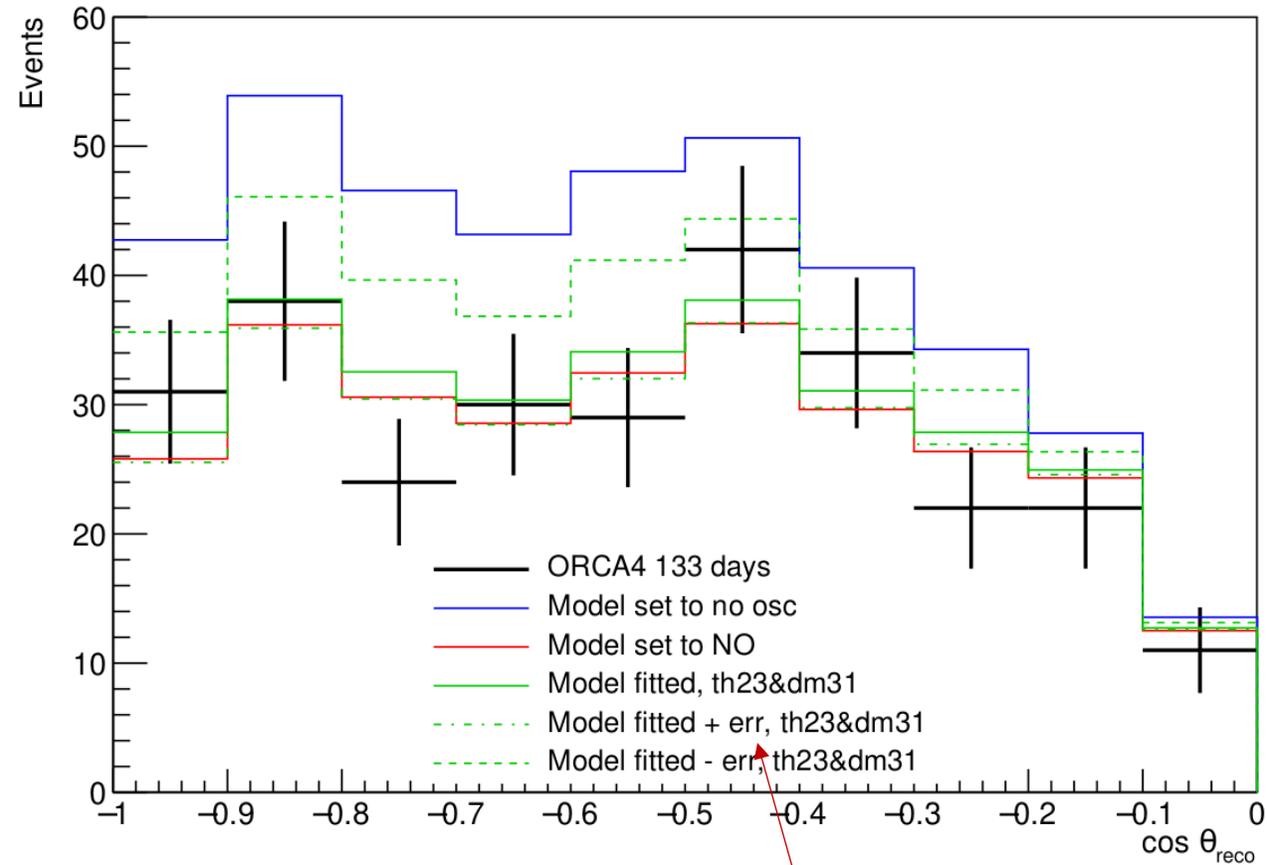
Event distribution [ORCA4 133 days]



Event distribution [ORCA4 133 days]



Fit MONA model to ORCA4



Error on Th23

Parameter	Fitted value	Best fit value
Th23 [deg]	34 +- 11.8	49.0 +- 1.1
Dm31 ² [10 ⁻⁵ eV ²]	2.21 +- 0.33	2.514 +- 0.028