$\nu_\mu \rightarrow \nu_e$ sterile analysis status

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21 March 2017

Shape analysis

Syst. uncertainties

Matter effects (const. density)

POI:

- $\sin^2 2\theta_{\mu e} = 4\left|U_{\mu 4}\right|^2 |U_{e4}|^2$
- Δm^2_{41}

Nuisance parameters:

$\theta_{12}, \theta_{13}, \theta_{23}, \theta_{34}, \delta_1, \delta_2, \delta_3$

Costants: Δm^2_{21}

Prior on Δm^2_{31}

- Signal channels:
  - $\boldsymbol{\nu_\mu \rightarrow \nu_e}$
  - $\boldsymbol{\bar{\nu}_\mu \rightarrow \bar{\nu}_e}$
- Background channels:
  - $\boldsymbol{\nu_e \rightarrow \nu_e}$
  - $\boldsymbol{\bar{\nu}_e \rightarrow \bar{\nu}_e}$
- Background (not osc):
  - ***NC***
  - $\boldsymbol{\tau \rightarrow e}$

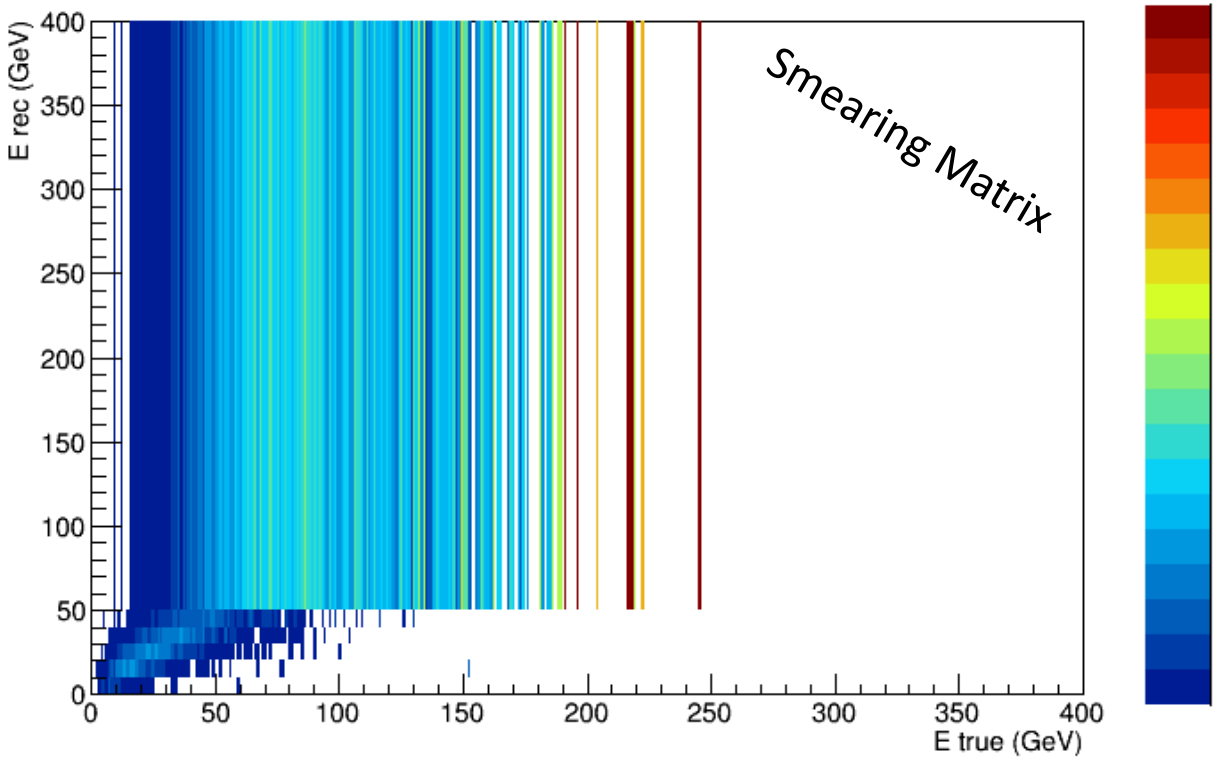
NB: θ_{ij} and δ_k are not physical observables. They depend on the model and parametrization.
In particular, they are not the same ones of a 3-ν model.

Ingredients

Normalization on the total number of events expected from ν_e beam contamination in case of no oscillation ($N_{\nu_e}^{beam}$):
$N_{\nu_e}^{beam} = 31.7$

Binning: {0, 10, 20, 30, 40, 50, 400} [GeV]

Background: {0.21, 0.57, 0.17, 0.08, 0.06, 0.11}



Likelihood:

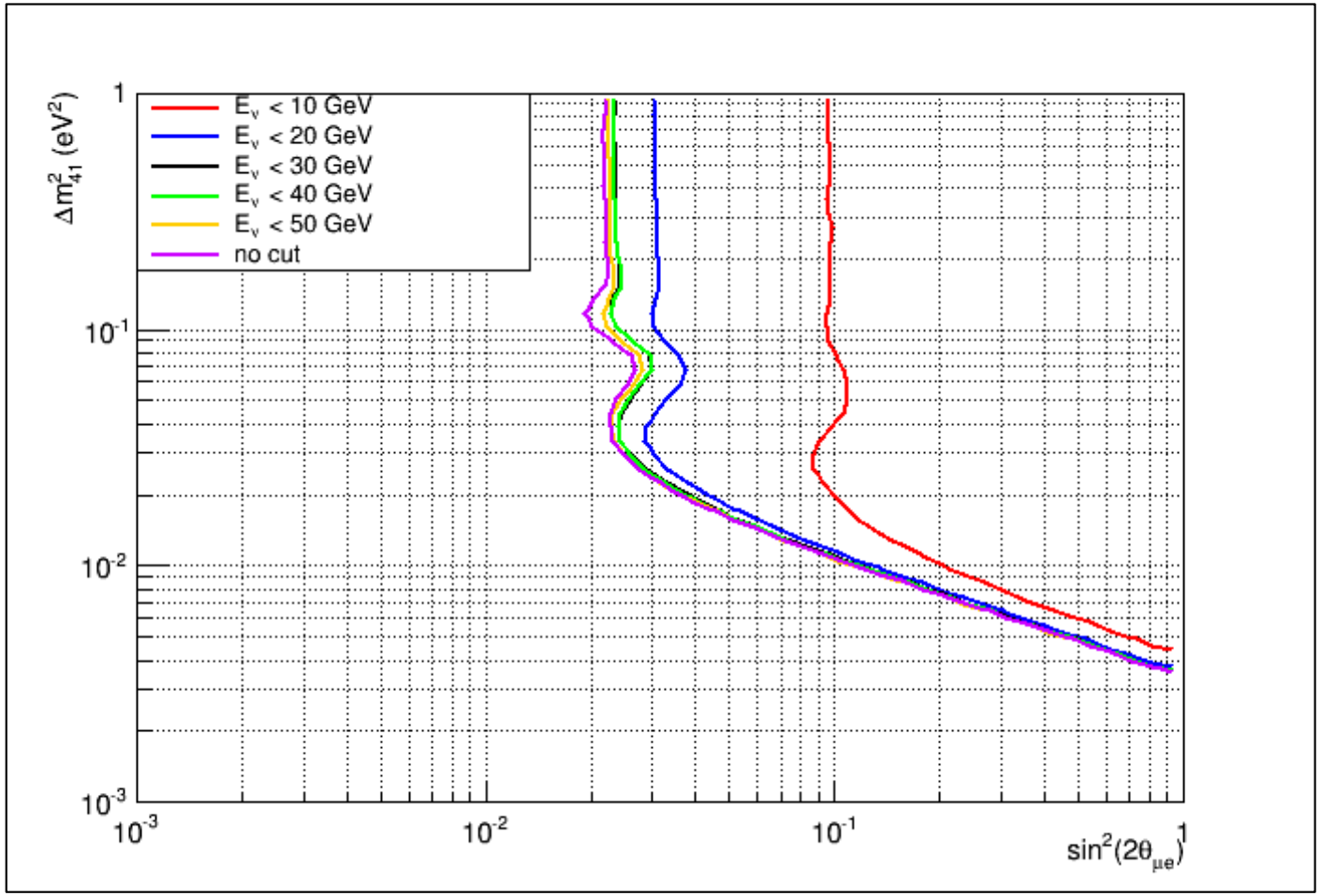
$$L_{shape} = \prod_i \left[Pois\left(n_i, \lambda_i(1+k_i)\right) \times Gaus(k_i, 0, \sigma_i) \right] \times Prior(\Delta m_{23}^2)$$

$\lambda_i(\theta)$ n. of expected events in bin i
n_i n. of observed events in bin i

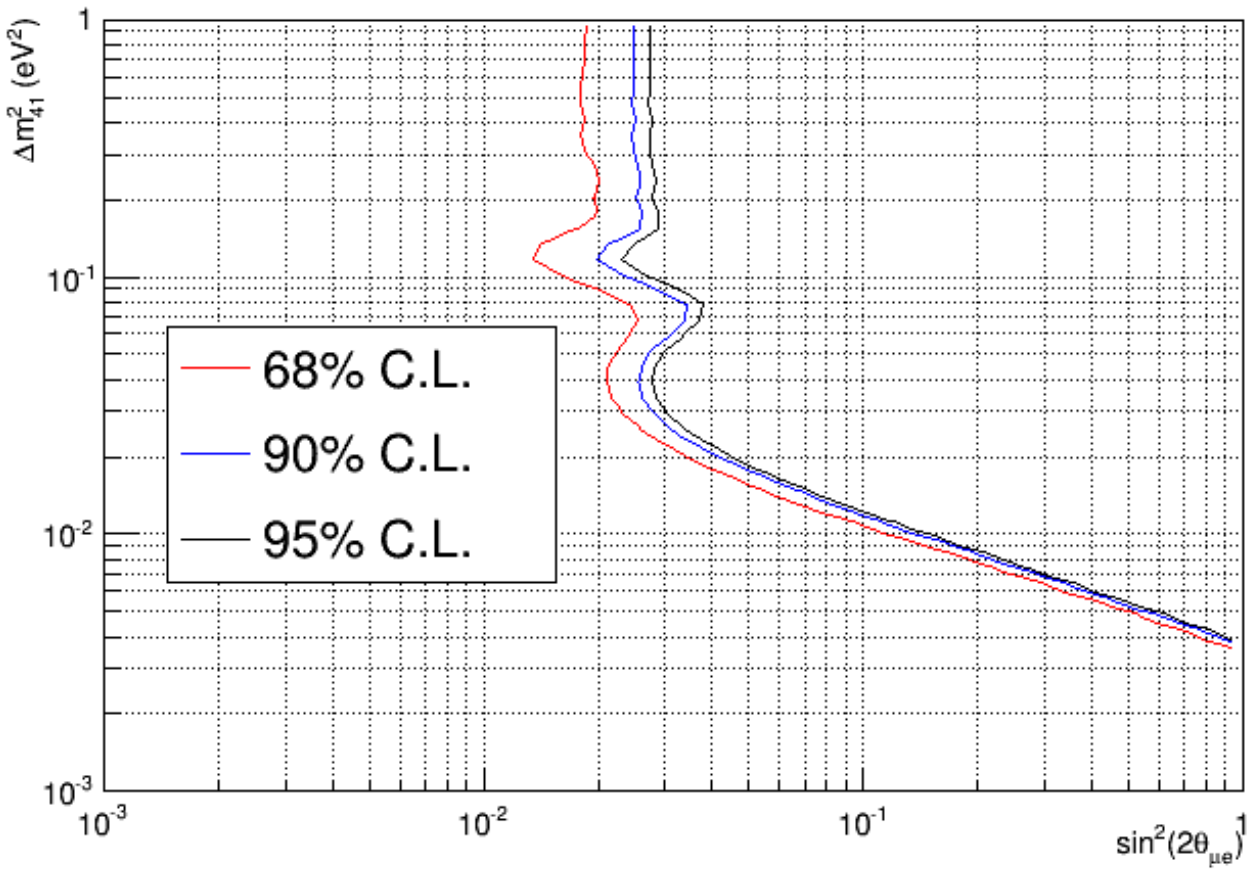
Test statistic: profile likelihood ratio $t_\mu = -2 \ln \lambda$

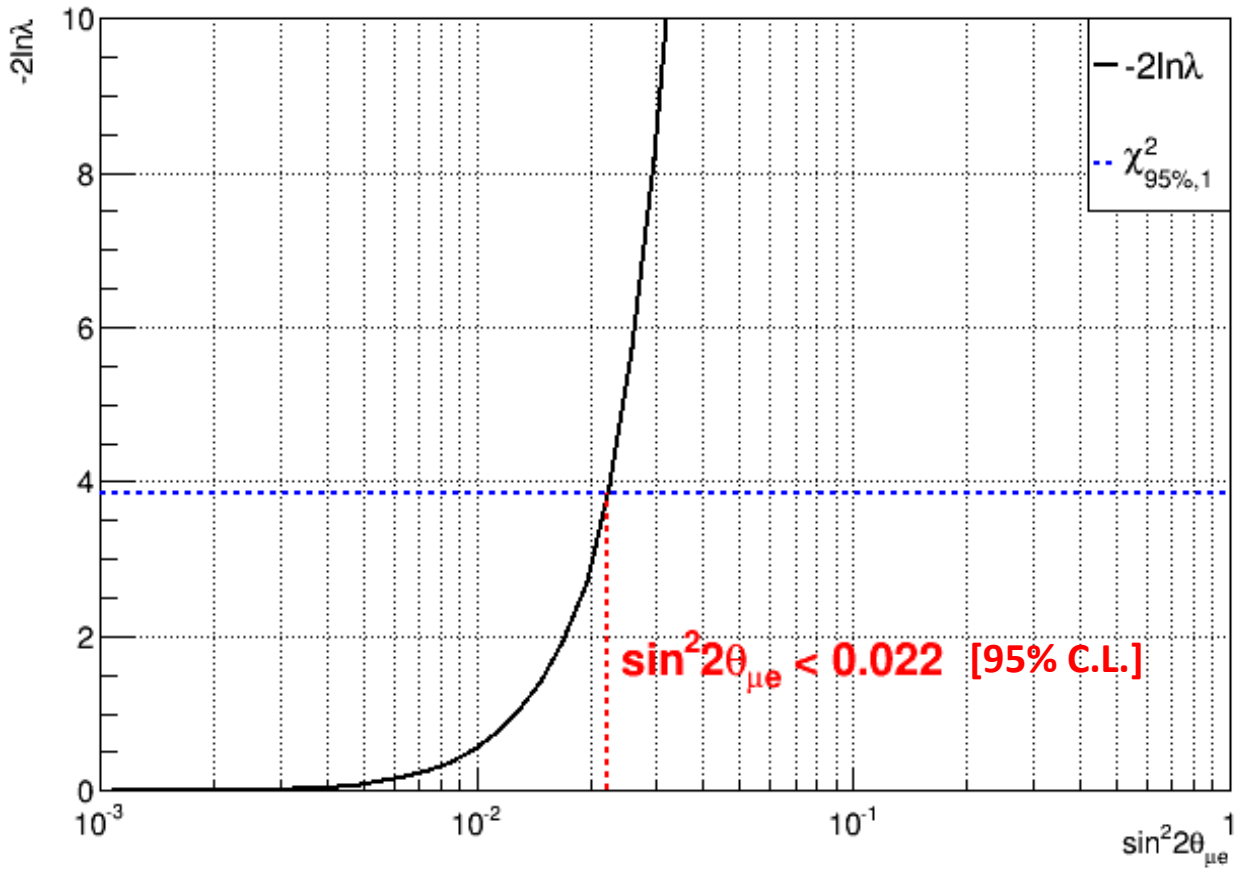
Sensitivity VS E_{cut}

Best sensitivity is obtained from energy distribution *without cut*



Exclusion


Δm^2_{41} (eV^2)
1
10^{-1}
10^{-2}
10^{-3}
10^{-3}
10^{-2}
10^{-1}
1
$\sin^2(2\theta_{\mu e})$
68% C.L.
90% C.L.
95% C.L.


-2lnλ
10
8
6
4
2
0
10^{-3}
10^{-2}
10^{-1}
1
$\sin^2 2\theta_{\mu e}$
-2lnλ
$\chi^2_{95\%,1}$
$\sin^2 2\theta_{\mu e} < 0.022$ [95% C.L.]

Conclusions

- Preliminary exclusion plot are ready
- They should be update according to the new numbers of bkg and normalization