

Machine Requirements for a Neutrino Factory

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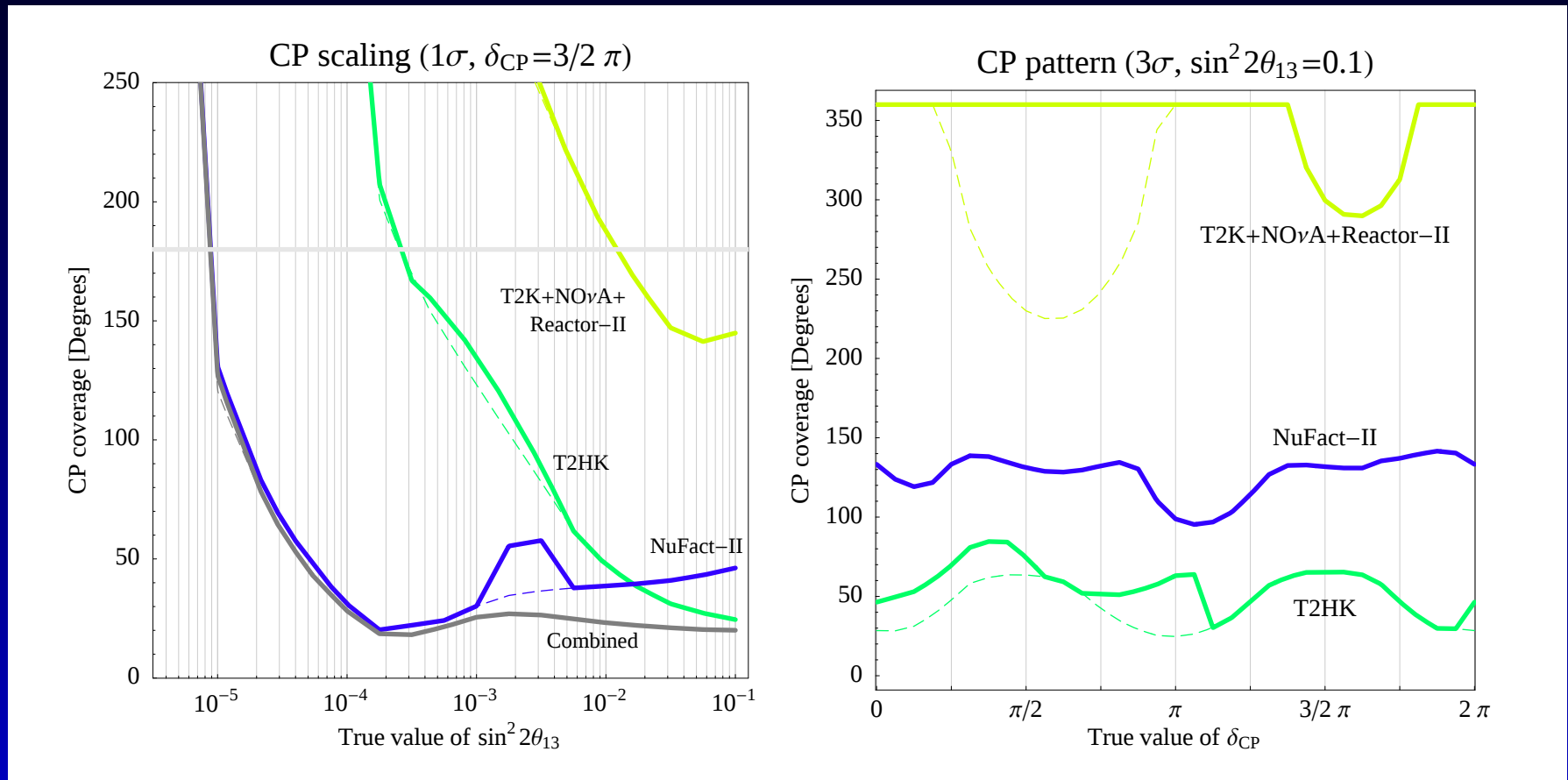
University of Wisconsin

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Laboratori Nazionali di Frascati

Frascati, Italy

Sensitivity



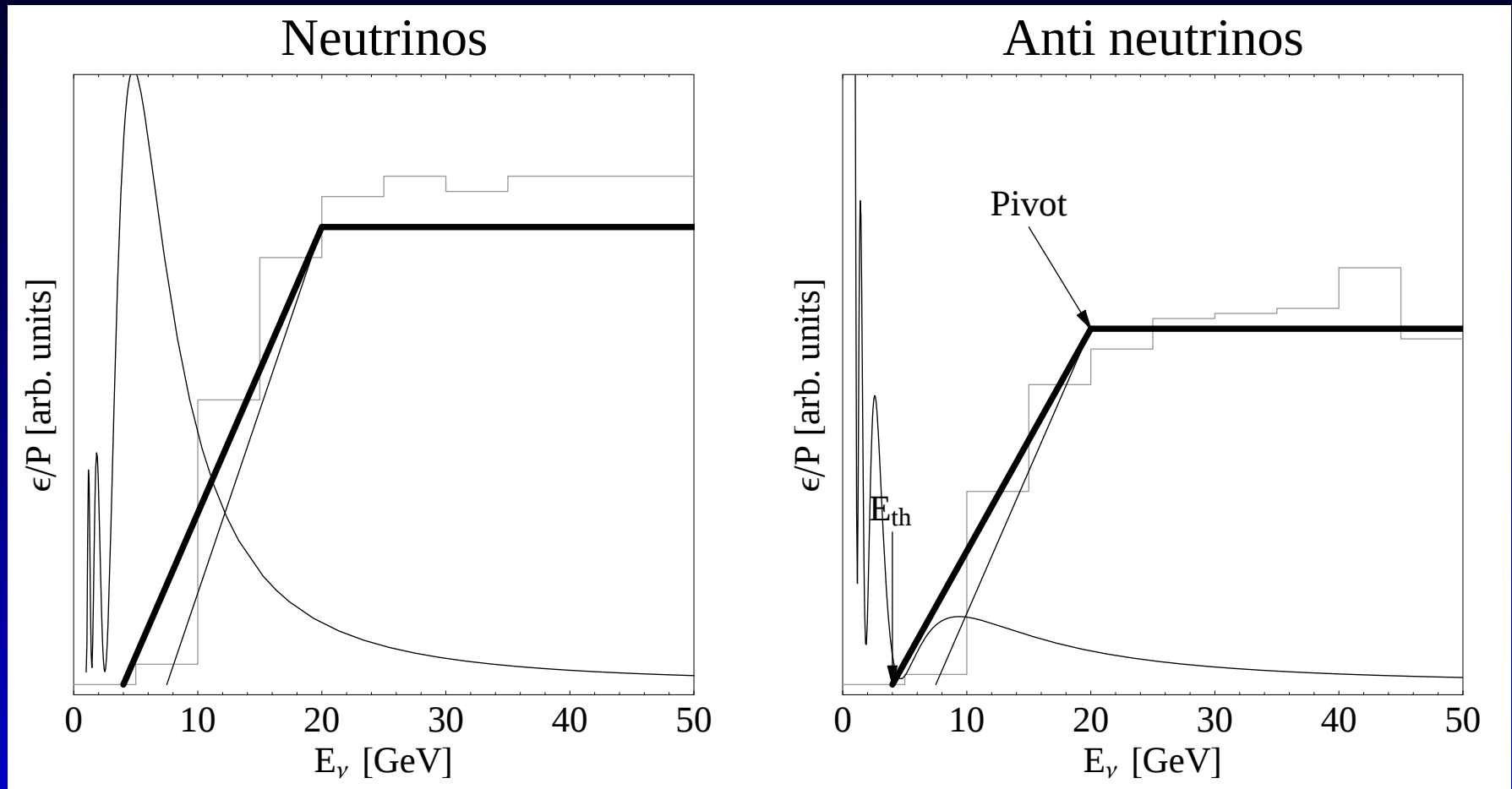
from Huber *et al.*, 2005.

large θ_{13} performance dominated by matter density –
ask geo-physicists!

Canonical numbers

- $E_\mu = 50 \text{ GeV}$
- 10^{21} useful decays/a,
- 4 y ν and $\bar{\nu}$ running each
- 50 kt detector
- Energy given by detector threshold
- Factor 2 in luminosity probably okay

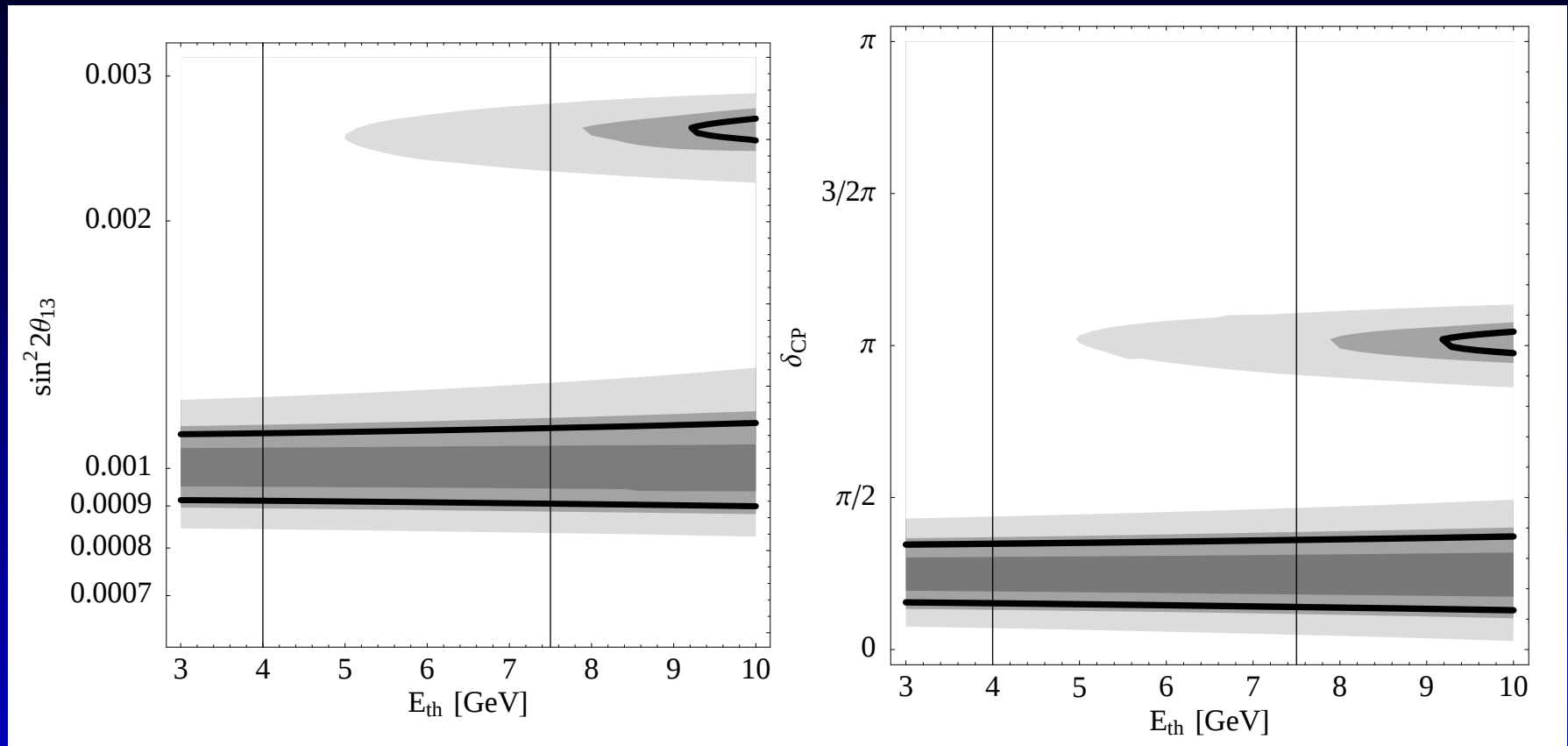
Threshold – I



grey curves taken from *Cervera et al., 2000*.

thick black line corresponds to *Huber et al., 2002*.

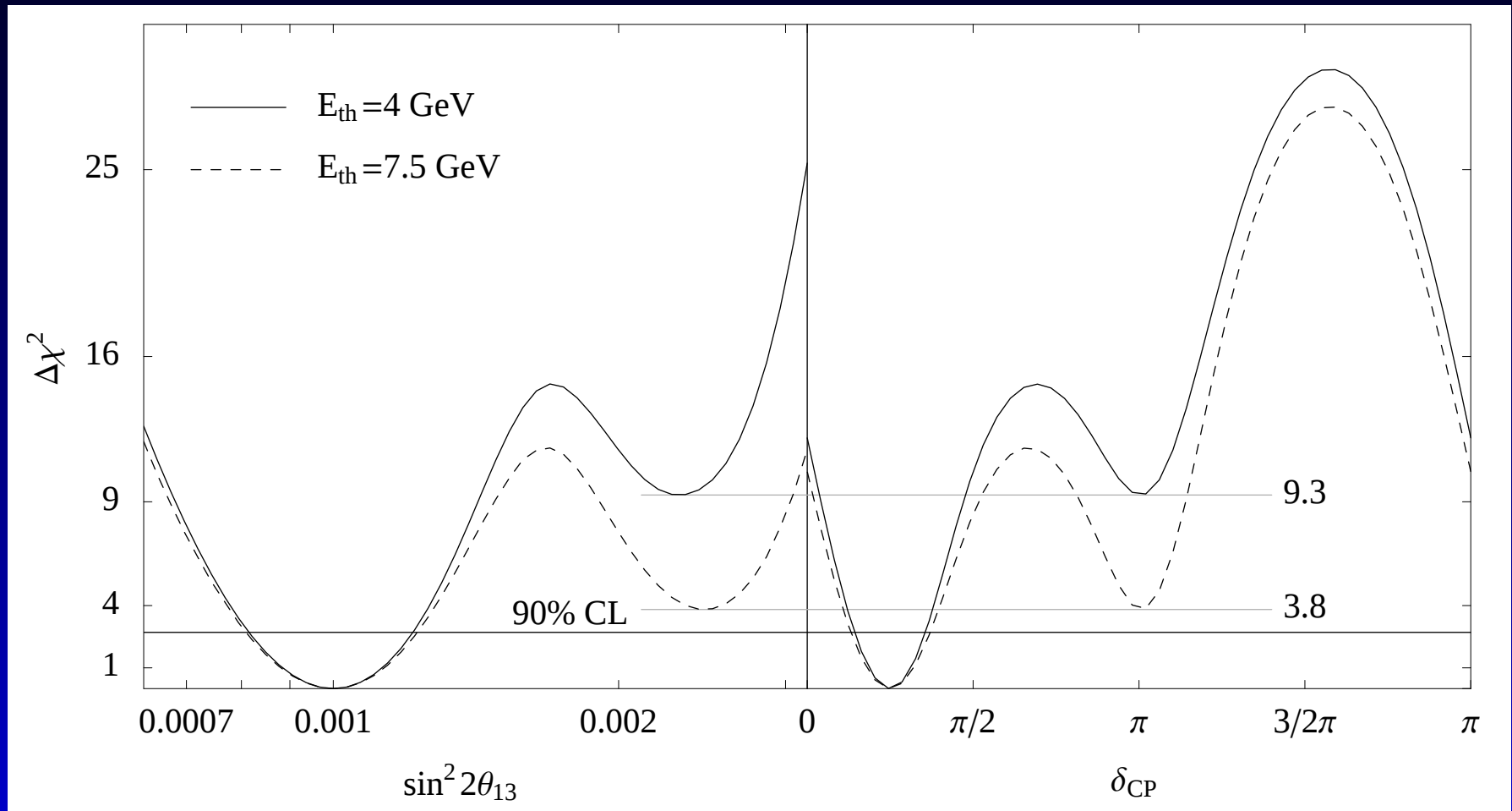
Threshold – II



from Huber *et al.*, 2002.

Impact of intrinsic degeneracy strongly depends on the threshold

Threshold – III



from Huber *et al.*, 2002.

Even small improvements help a lot!

Conclusion

Reducing the neutrino energy
requires re-considering the detector –

threshold and energy resolution

otherwise we need

$$E_\mu = 50 \text{ GeV and } 10^{21} \text{ useful decays/a}$$