Neutrino Oscillation Parameters

parameter	bf$\pm 1\sigma$	1σ acc.	2σ range	3σ range
Δm^2_{21} $[10^{-5} eV^2]$	7.65 ± 0.23	3%	$7.25 - 8.11$	$7.05 - 8.34$
$\lvert\Delta m^2_{31}\rvert$ $[10^{-3} eV^2]$	$2.4^{+0.12}_{-0.11}$	5%	$2.18 - 2.64$	$2.07 - 2.75$
$\sin^2\theta_{12}$	$0.304^{+0.022}_{-0.016}$	7%	$0.27 - 0.35$	$0.25 - 0.37$
$\sin^2\theta_{23}$	$0.50^{+0.07}_{-0.06}$	14%	$0.38 - 0.64$	$0.36 - 0.67$
$\sin^2\theta_{13}$	–	–	≤ 0.04	≤ 0.056

Best fit values (bf), 1σ errors, relative accuracies at 1σ, and 2σ and 3σ allowed ranges of three-flavor neutrino oscillation parameters from a combined analysis of global data.

M. Maltoni, T. Schwetz *et al.*, arXiv:0812.3161

Future:

SNO III: $3\sigma(\sin^2\theta_\odot) = 21\%$;

3 kTy KamLAND: $3\sigma(\Delta m^2_\odot) = 7\%$, $3\sigma(\sin^2\theta_\odot) = 18\%$;

A. Bandyopadhyay et al., hep-ph/0410283

SK-Gd (0.1% Gd: $43\times$(KL $\bar{\nu}_e$ rate)), 3y: $3\sigma(\Delta m^2_\odot) \cong 4\%$

S. Choubey, S.T.P., hep-ph/0404103;

J. Beacom and M. Vagins, hep-ph/0309300

KL type reactor $\bar{\nu}_e$ detector, $L \sim 60$ km, ~ 60 GW kTy:

$3\sigma(\sin^2\theta_\odot) \cong 6\%$ (9%) for 2% (5%) syst. error; $+\ \delta(\sin^2\theta_{13}) : 9\%$ (11%)

A. Bandyopadhyay, et al., hep-ph/0410283

T2K (SK): $3\sigma(|\Delta m^2_{\rm atm}|) \cong 12\%$

P. Huber et al., hep-ph/0403068

Future Precision Measurements

• To which level we should measure θ_{13}?

• What precision in determination of $\Delta m^2_{\odot}$, $\theta_{\odot}$, Δm^2_{atm}, θ_{atm} we should aim at?

• How important is the determination of sgn(Δm^2_{atm}), i.e. of the type of $\nu-$ mass spectrum?

• How important is to undertand the status of the CP-symmetry in the lepton sector: violated due to δ (Dirac), and/or due to α_{21}, α_{31} (Majorana)?

• How important is to Determining, or obtaining significant constraints on, the absolute scale of ν_j- masses, or min(m_j)?