



MINOS Results on Atmospheric Neutrinos and Anti-Neutrinos

□ Atmospheric neutrino results based on 1657 live-days of far detector data (24.6 kt-yrs).

□ Observe 1128 candidate events:

- ◆ 572 contained vertex muons.
- ◆ 292 contained vertex showers.
- ◆ 264 ν -induced rock muons.

□ MINOS detector is magnetised, enabling direct separation of neutrinos and anti-neutrinos. Measuring charge ratio:

$$R_{\bar{\nu}/\nu}^{\text{data}} / R_{\bar{\nu}/\nu}^{\text{MC}} = 1.04^{+0.11}_{-0.10} \pm 0.10$$

□ Fit oscillations separately for neutrinos and anti-neutrinos. Testing CPT symmetry:

$$|\Delta m^2| - |\Delta \bar{m}^2| = 0.4^{+2.5}_{-1.2} \times 10^{-3} \text{ eV}^2$$

90% C.L, at maximal mixing.

