KM3NeT/Super-ORCA: Measuring the leptonic CP-phase with atmospheric neutrinos - a feasibility study

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Measuring $\delta_{CP}$ with atmospheric neutrinos

- Oscillation pattern of atmospheric neutrinos depends on $\delta_{CP}$
- $\delta_{CP}$ sensitivity: $E_\nu < 3\text{GeV}$
- Good $\nu_e / \nu_\mu$ separation crucial

$\rightarrow$ $\delta_{CP}$ sensitivity study for possible future multi-Mton Cherenkov detector

- KM3NeT/Super-ORCA: ~10x denser version of ORCA (for comparison: still ~100x smaller instrumentation density than SK)
  $\rightarrow$ ~100 detected photons per GeV
  $\rightarrow$ e/µ separation via angular light profile: 95% purity @ $E_\nu = 1\text{GeV}$
**$\delta_{CP}$ sensitivity**

- Method: $\chi^2$ minimisation assuming a test $\delta_{CP}^{test}$ value and simultaneously fitting neutrino oscillation and nuisance parameters

![Graph showing sensitivity to $\delta_{CP}$]

- Complementarity to long-baseline experiments:
  beam / atm. neutrinos more precise at $\delta_{CP} = 0 \& \pi / 0.5\pi \& 1.5\pi$

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