Studying neutrino absorption through the Earth with ANTARES and KM3NeT/ARCA

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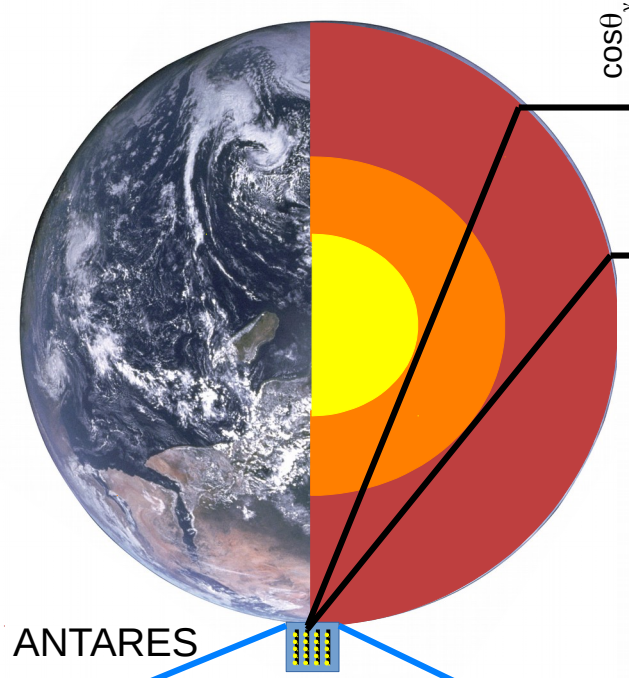
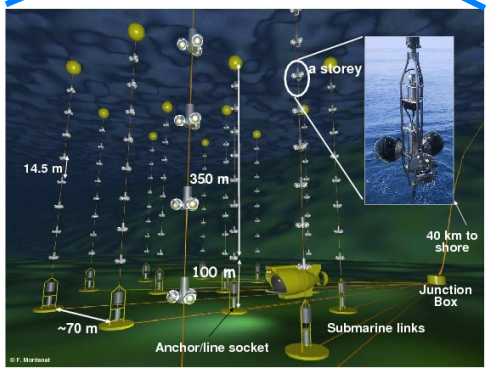
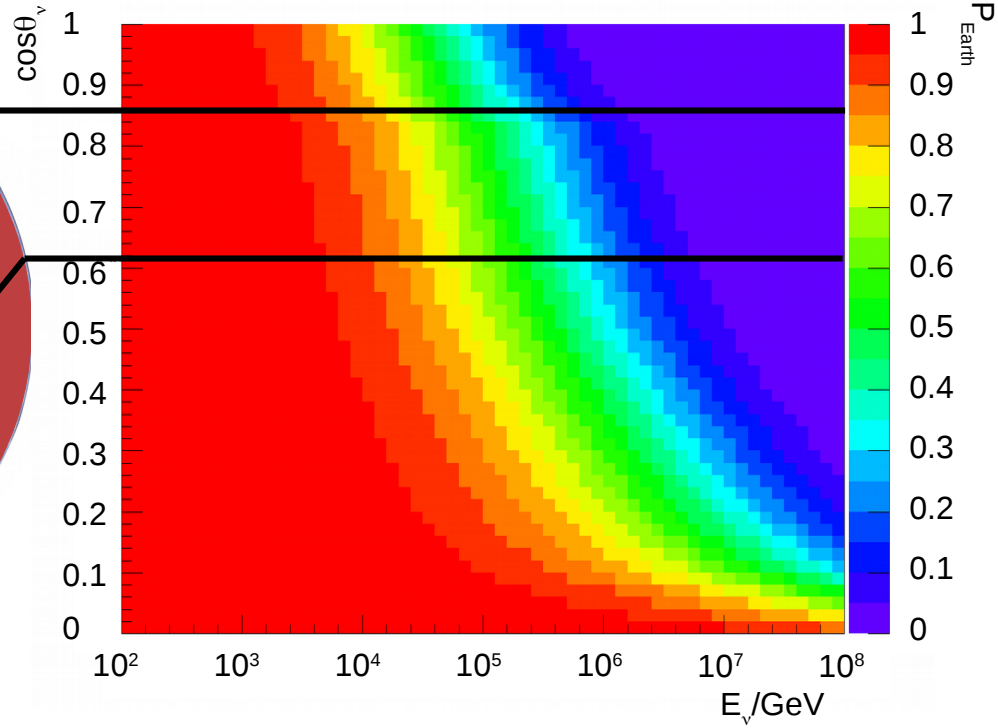
on behalf of the ANTARES and KM3NeT collaborations





10 Mton under-sea (2.5km depth) Cherenkov ν-detector



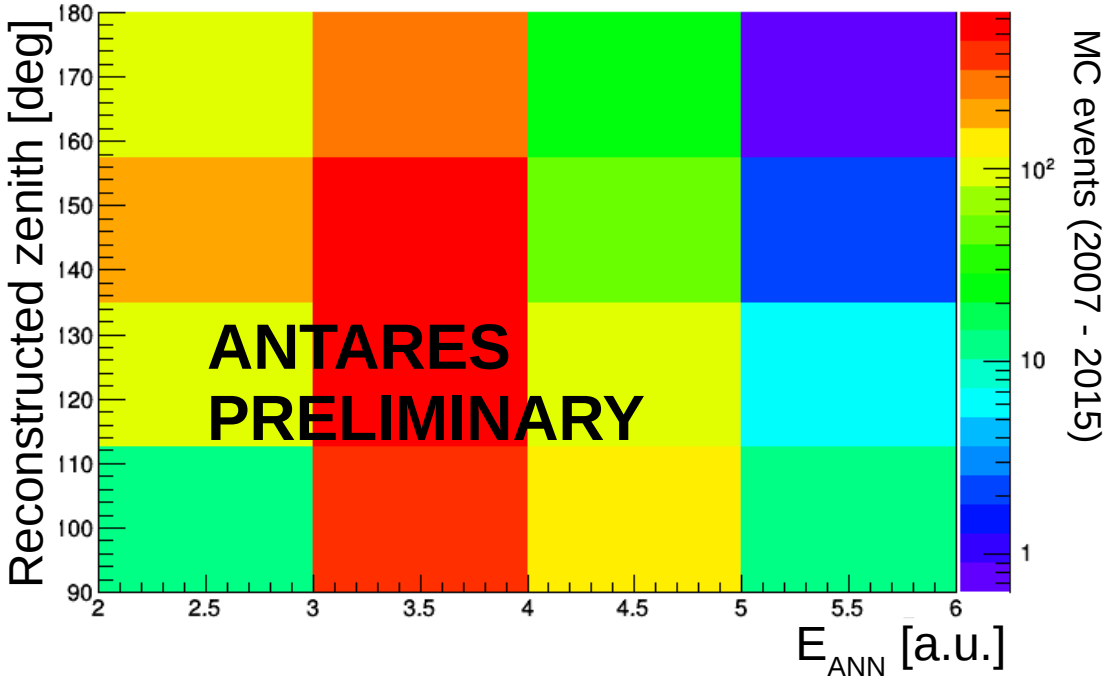
PREM Model for Inner Earth
and
Standard Model Cross section

→ **Earth crossing probability**

Absorption effects become visible for **vertical** (passing through the whole Earth, including the core) and **high energy** events (larger $\sigma_{\nu N}$) from atmospheric neutrinos

Modified cross section values (e.g. multiple of the SM one) will produced difference in the **zenith-energy** distribution of reconstructed events at the detector

Muon neutrinos considered, **upward-going** reconstructed track-like events



Absorption effects smeared out by:

Detector efficiency – increasing and then flattening out with the energy

Energy resolution – limited for passing through events

Steeply falling **atmospheric neutrino rate**

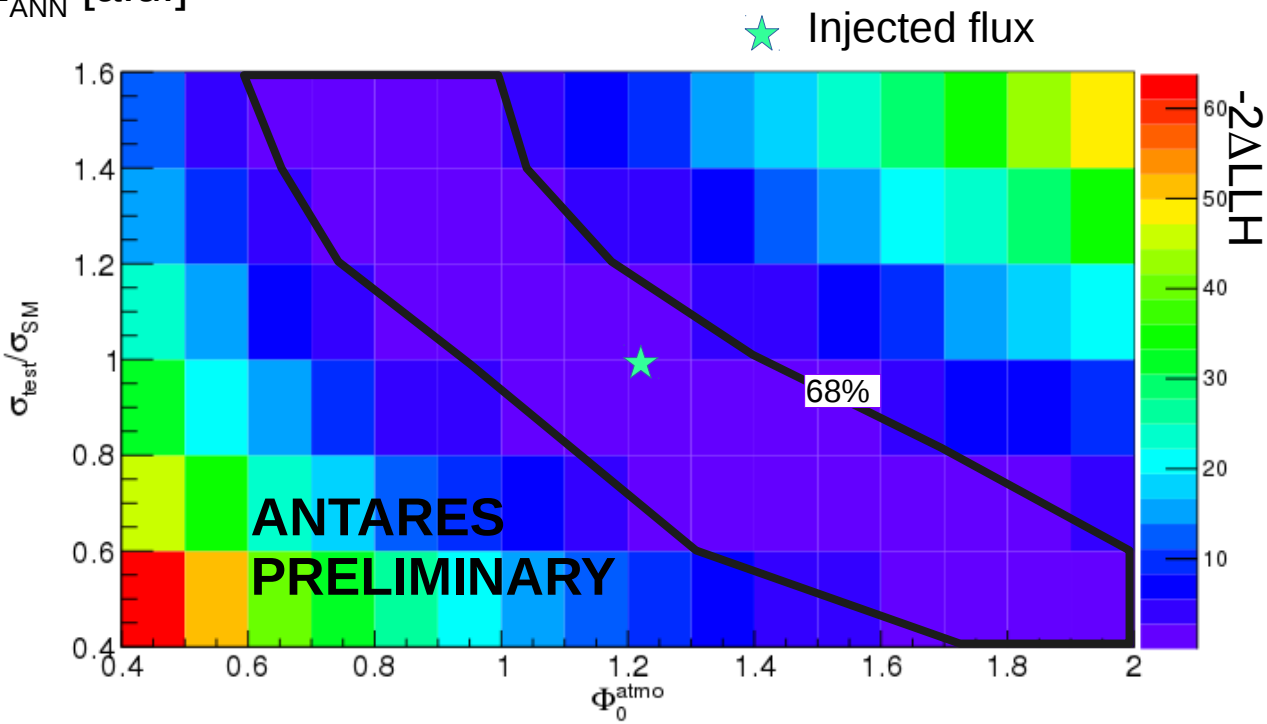
Limited statistics for ANTARES, much larger expected for KM3NeT

2D likelihood fitting
-2ΔLogLikelihood estimator
μ_i from MC templates

$$L = \prod_{S\in\{sh,tr\}} \prod_{i=0}^{N_S} L_{i,S}$$ Total Likelihood

$$L_{i,S} = e^{-\mu_{i,S}} \cdot \frac{\mu_i^{k_{i,S}}}{k_{i,S}!}$$ Individual (bin) likelihood

Degeneracy between cross section and atmospheric flux normalisation as the event rates is also dependent on σ



Systematics to be added