Universidad de Oviedo

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Multiprespective neutrino studies

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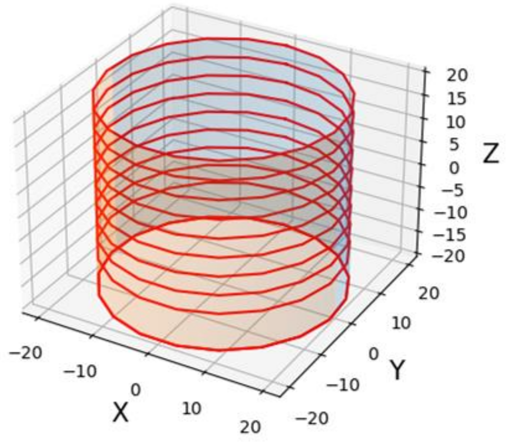
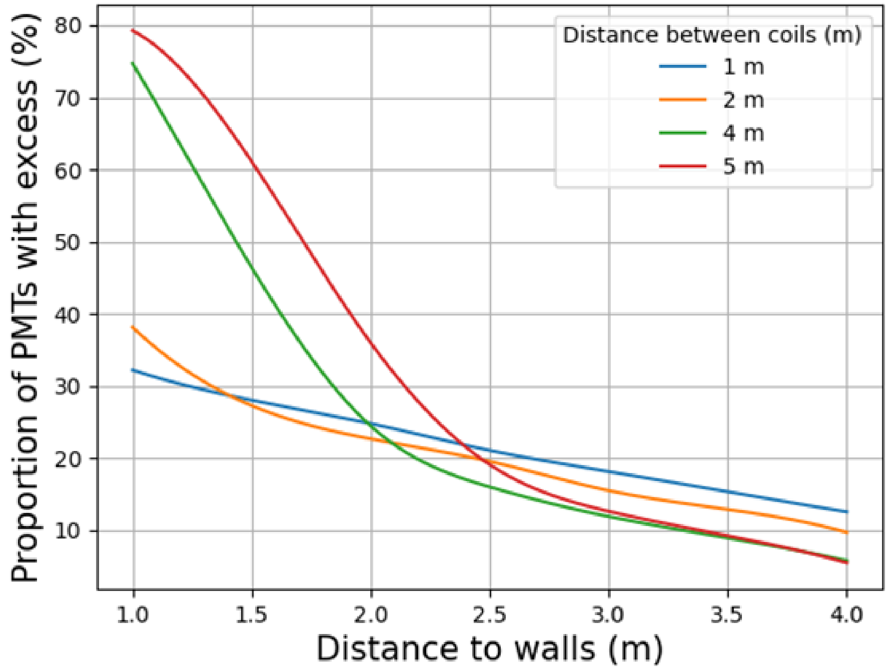
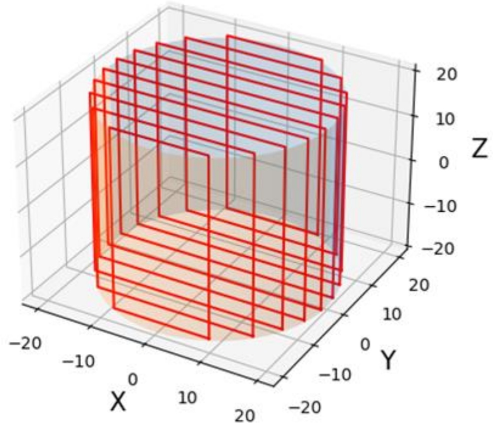
1. Geomagnetic field compensation system

The proper operation of Cherenkov-type neutrino detectors usually involves a coil-based geomagnetic field compensation system to ensure maximum efficiency of the PMTs.







An exhaustive study has been carried out on the influence of different parameters involved, such as the size of the detector or the distance between PMTs and coils on the compensation efficiency, based on a basic design consisting of one set of circular coils and one set of rectangular coils.

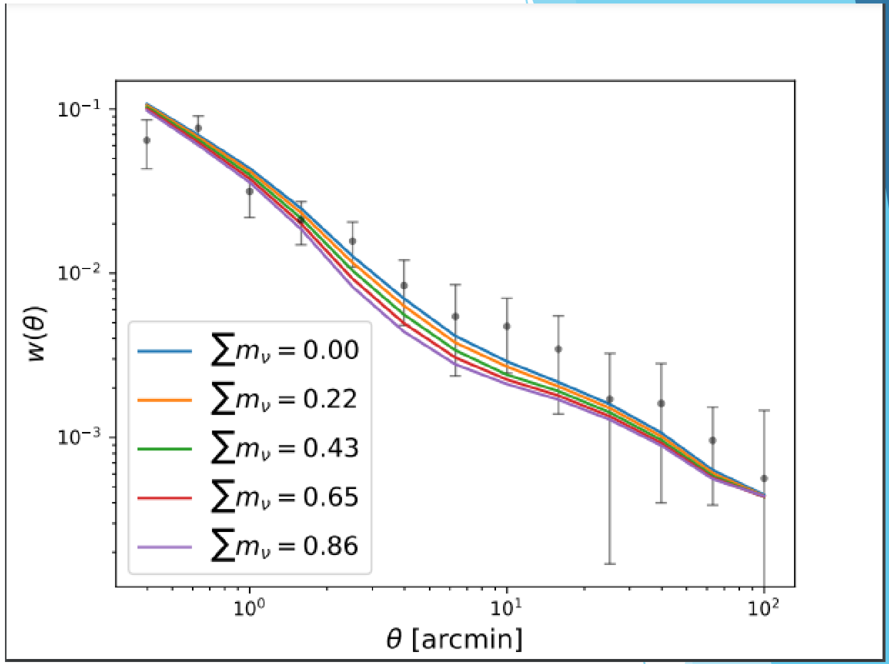
One of the most important conclusions is how establishing an appropriate PMTS distance between PMTS and coils can greatly facilitate, both in terms of construction and economics, the installation of the compensation system.

Design of Hyper-K compensation system

2. *Weak lensing to constrain sum of neutrino mass*

We are currently working on setting limits to the neutrino mass sum through cosmological effects such as weak lensing.

The non-zero cross-correlation between background SMGs and lenses, resulting from magnification bias, depends on cosmology as well as neutrino mass and is therefore sensitive to it.

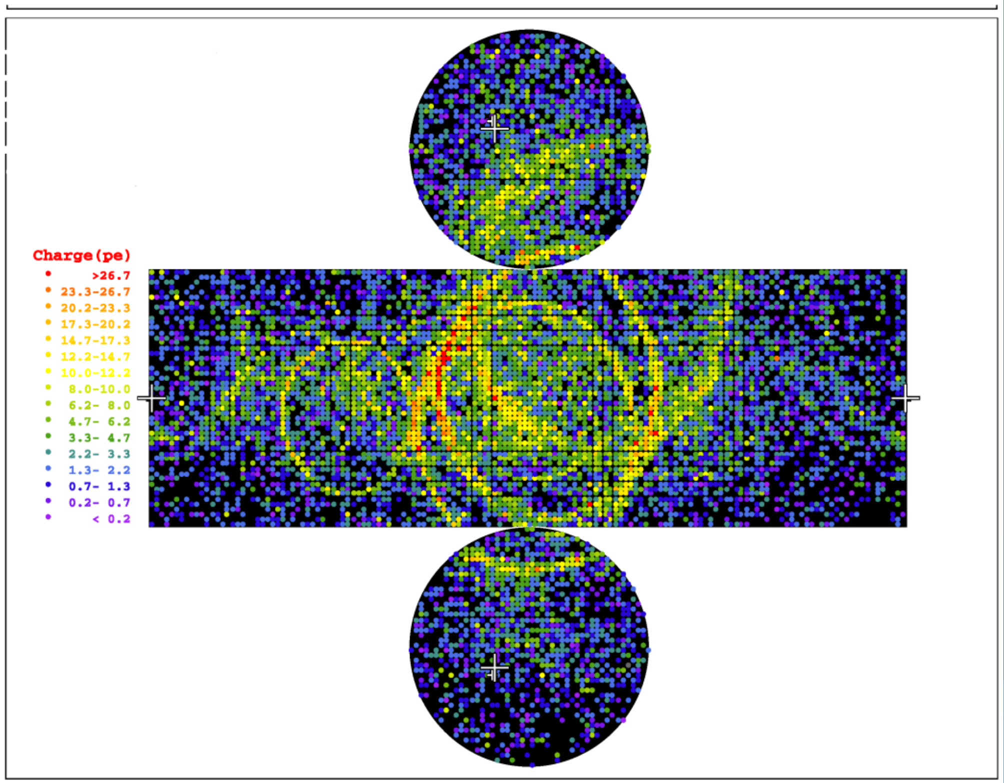


$$w_{fb}(\theta) = 2(\beta - 1) \int_0^\infty \frac{dz}{\chi^2(z)} n_f(z) W^{\text{lens}}(z) \int_0^\infty dl \frac{l}{2\pi} P_{\text{g-dm}}(l/\chi(z), z) J_0(l\theta),$$

3. Neural networks for tau neutrino identification

Development of artificial intelligence algorithms for the identification of tau neutrinos. These events are hard to identify because:

- Difficult to identify leptonic channel from background
- Hadronic channel creates multirings



✓ The key to identifying them effectively is to select several appropriate physical variables that distinguish them from the background.

Goal: correctly identify tau events and then inferr some relevant parameters such as cross-section

Thank you very much!

For questions and friendly discussion visit poster **Ex- 15** in the Poster Session