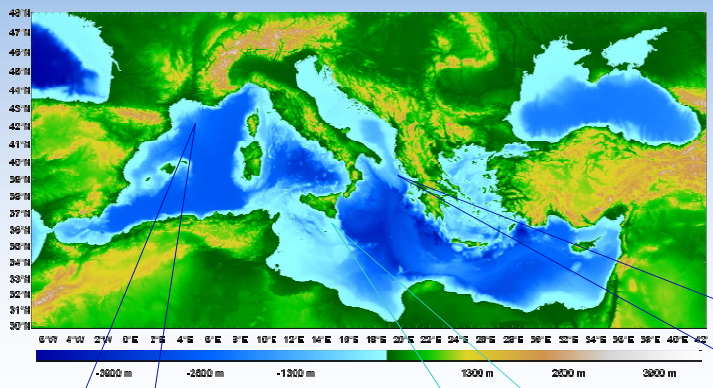
KM3NeT

J. Perkin and L. F. Thompson on behalf of the KM3NeT consortium: http://www.km3net.org

KM3NeT will be one of the world's largest particle detectors, built at the bottom of the Mediterranean Sea. It will provide a research infrastructure for a rich and diverse deep-sea scientific program.



KM3NeT is in its design study phase and is building on experience from 3 current Mediterranean projects: ANTARES, NEMO and NESTOR

The proposed deep-sea infrastructure will serve as a platform for instrumentation of ocean sciences:

- Oceanology
- Marine Biology
- Environmental Science
- Geology and Geophysics

ANTARES
- 12 detector lines composed of 25 storeys
- 3 PMTs per storey
- 450m tall
- 0.1km^2 surface area
- Reconstructing muons since March'06

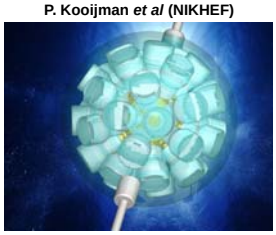
NEMO
- R&D project for deep sea neutrino telescope
- Test concepts for deployment & data flow, power distribution & PMT development
- Catania + Cappo Passero sites

NESTOR
- Tower of 12 floors in construction, rising 360m from seabed
- Each floor a 6-pointed star with 2 PMT / vertex
- Muon reconstructions since 2003

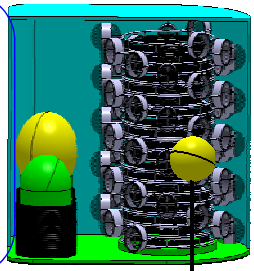
The weak nature of neutrino interactions preserves their energy and directionality, potentially allowing them to illuminate parts of the Universe opaque to charged particles and EM radiation. In order to observe the predicted fluxes one must instrument km^{3}s of material sensitive to the resulting secondary radiation. The deep Mediterranean permits observation of Cherenkov photons with attenuation lengths of up to 50m.

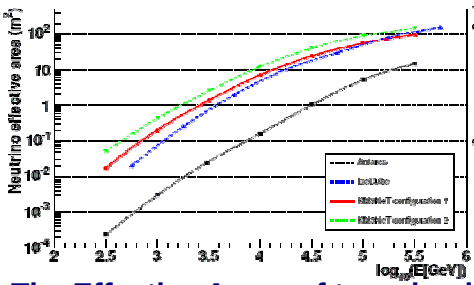
Some Lessons learnt so far:
Minimise № of wet connections
All data to shore + remote operation
Monitor location of flexible structures
Minimise offshore electronics
Compact + rapid deployment
Monitoring of detector environment

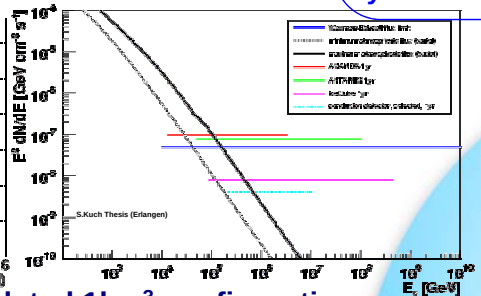
P. Kooijman *et al* (NIKHEF)



Multi PMT Optical Modules (left):
An option to increase photocathode area through single connection
Deployment of compact pre-connected structures (right):
Minimises wet mateable connections + maximises deployment speed
Hybrid & standard PMTs possible



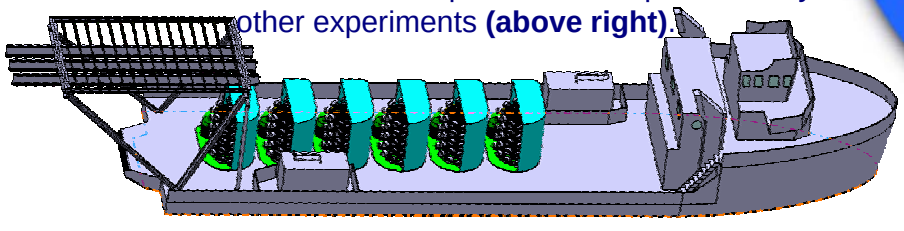




A 10" standard PMT housed in a glass sphere

The Effective Areas of two simulated 1km^3 configurations:
(Configuration 1: 127 lines in hexagon, 100m line spacing, 25 storeys, 15m apart, 3x10" PMTs per storey (ANTARES config)**)**
(Configuration 2: 225 lines in cuboid grid, 95m line spacing, 36 storeys, 16.5m apart, 21x3"PMTs per storey**)** have been compared for a given Mediterranean site **(above left)**.

An estimated limit on the diffuse neutrino flux for a simulated KM3NeT detector has been compared to limits published by other experiments **(above right)**.



Readout and Data Transmission

3 architectures considered:
- **Electro optical shore to junction-box cable, local control modules etc.**
- **1:1 copper / fibre mixed architecture**
- **1:1 photonics based structure, onshore time-stamping onshore laser, offshore reflective optical modulator**

KM3NeT
a cubic kilometre neutrino telescope in the Mediterranean Sea