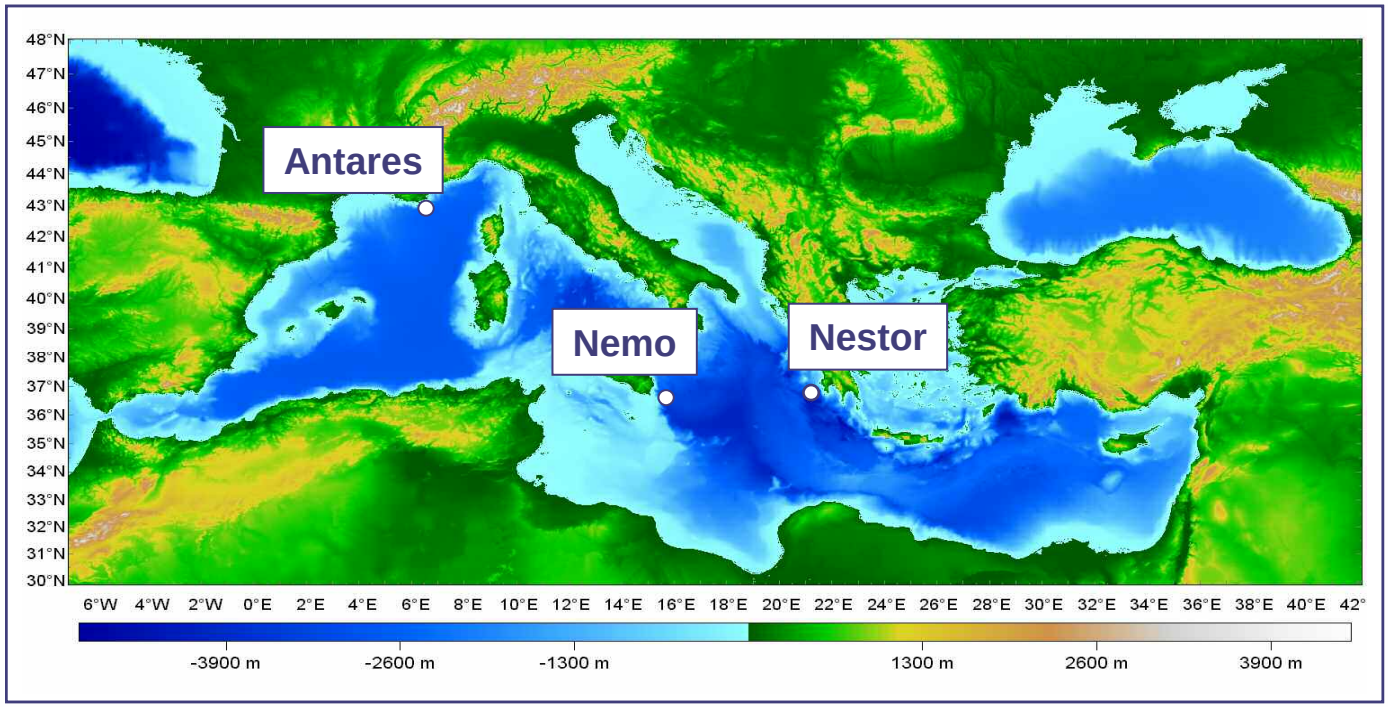
Sensitivity of KM3NeT deep-sea neutrino telescope to galactic sources

F. Jouvenot

J. Carr, D. Dornic, G. Maurin

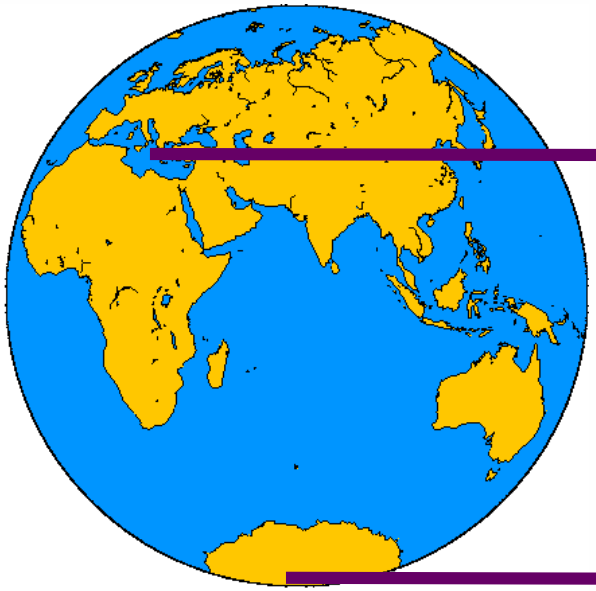
representing the KM3NeT consortium

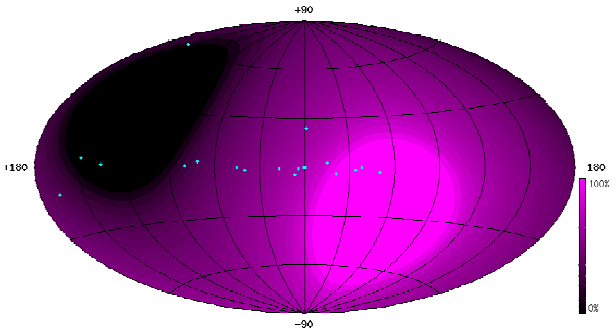
Toward the kilometre cube…



IceCube

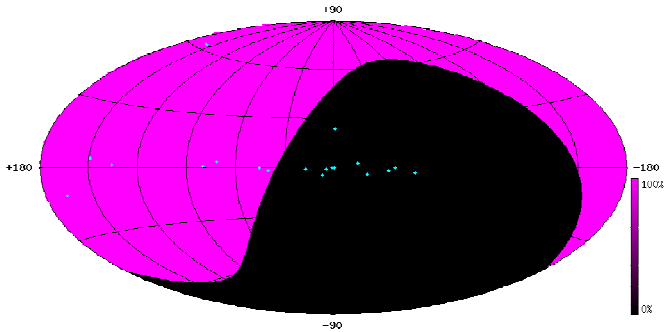
View of the sky





Mediteranean Sea

43º North : Galactic centre observed 2/3 of the time



South pole

- Instant view : 2 π sr
- Integrated view for a day : 3.5 π sr

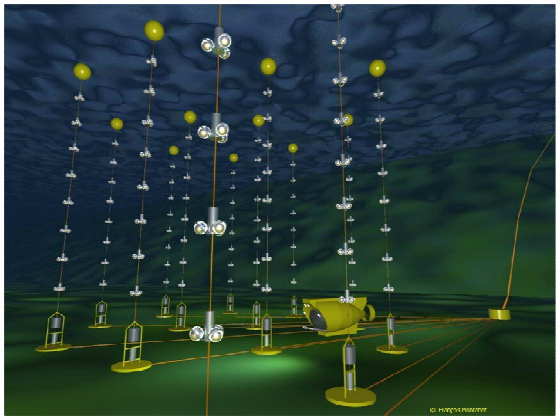
KM3NeT

Design study

FP6 European funding for a 3 year design study

2006 - 2008

How to Design a km^3 Deep-Sea ν Telescope



scale up

- Too expensive
- Too complicated
  production, deployment takes forever, maintenance impossible
- Not scalable
  (readout bandwidth, power, ...)

new design

dilute

PM distance
given by absorption length in water and PM properties

- Efficiency loss for larger spacing

- Cost-effective solutions
  to reduce price/volume by factor 2-5
- Stability
  goal: maintenance-free detector
- Fast installation
  time for construction & deployment less than detector life time
- Improved components

Nessy Steering

Track Generator

Isotropic & uniform muon track

Muon Spectrum

Detector geometry

Water Properties

Hit simulation

Time smearing *(TTS, Chromatic)*

K40 & biolum background

Photoelectron conversion

Electronics *(ARS)*

KM3 & Antares Data Interface

Selection and Reconstruction

Hit selection

Trigger

Reconstruction

Effective Area

Muon

Neutrino

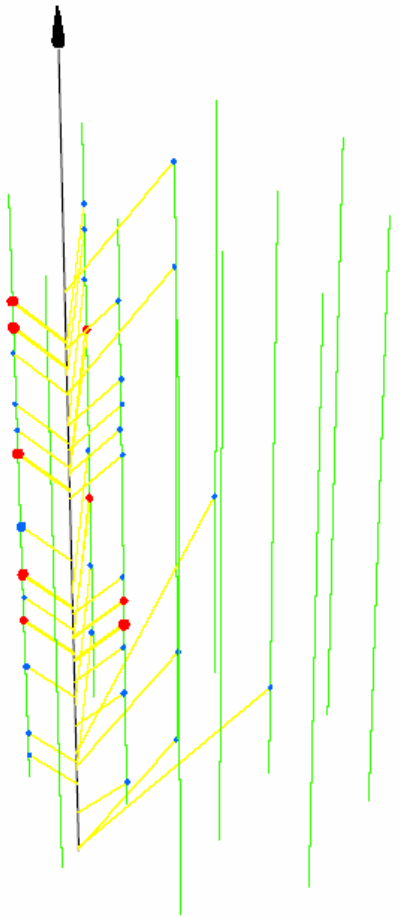
Astrophysics

Source simulation

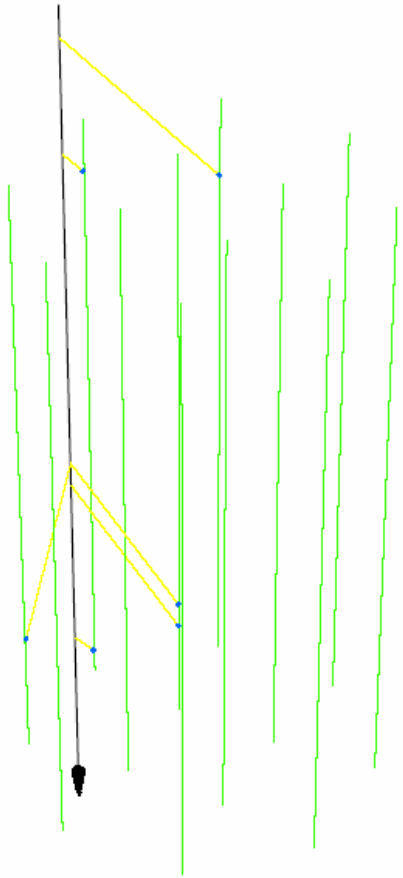
Probability of detection

Generated event

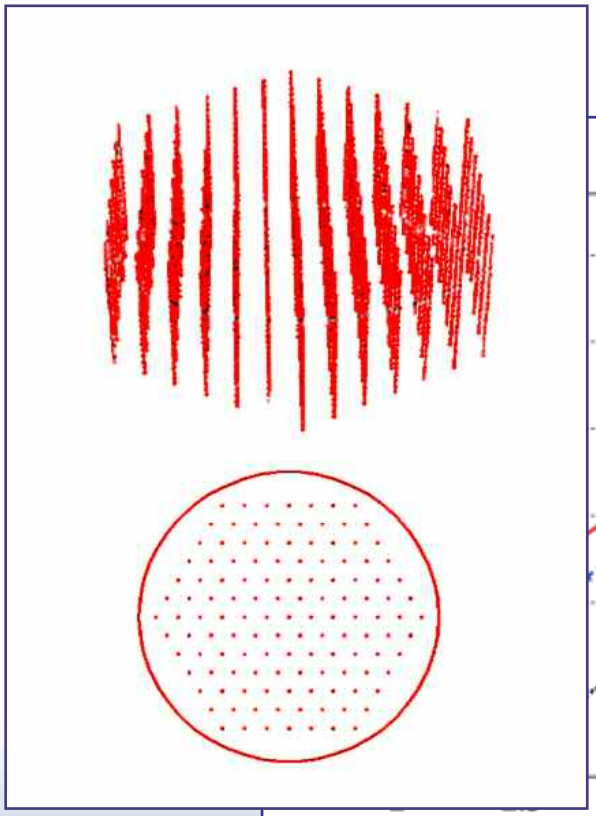
Typical upward going event

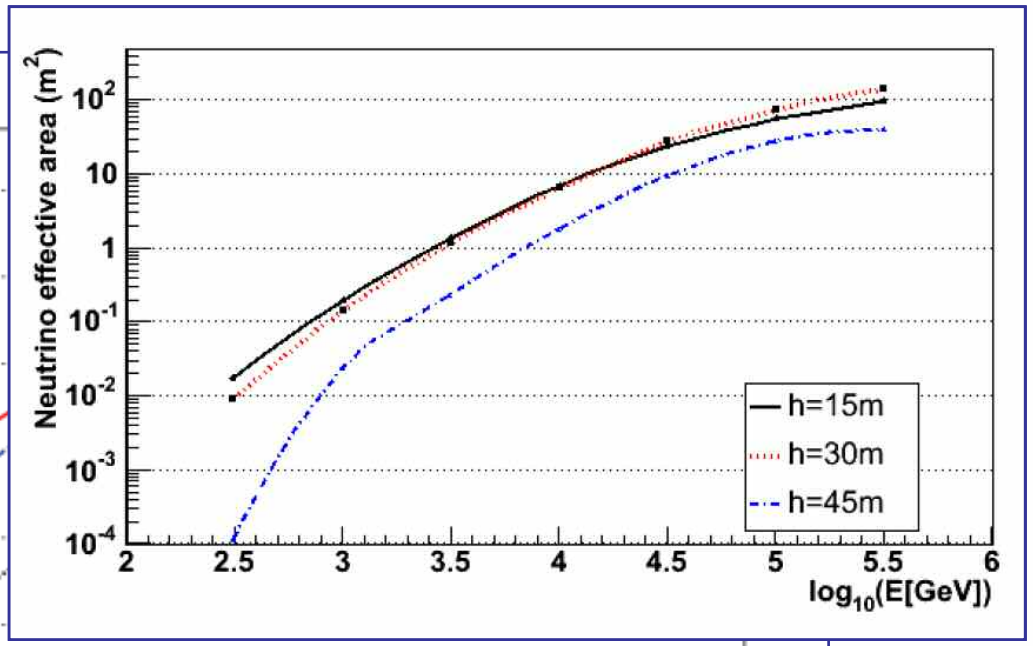


Typical downward going event



Configuration Studies





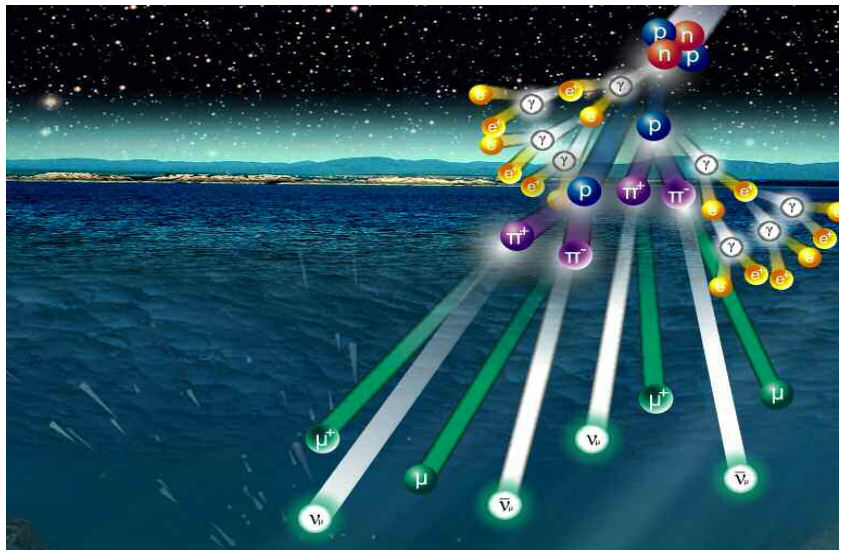
127 lines (25 storeys) – 6 rings
Instrumented volume 0.3 km^3
Absorption length – 30m
Background – 100 kHz

Storey distance – 15 to 30 m
Angular resolution (5 TeV) ~ 0.09°
Angular resolution (5 TeV) ~ 0.08°

Ref. ICRC0859, J. Carr et al

Galactic Sources

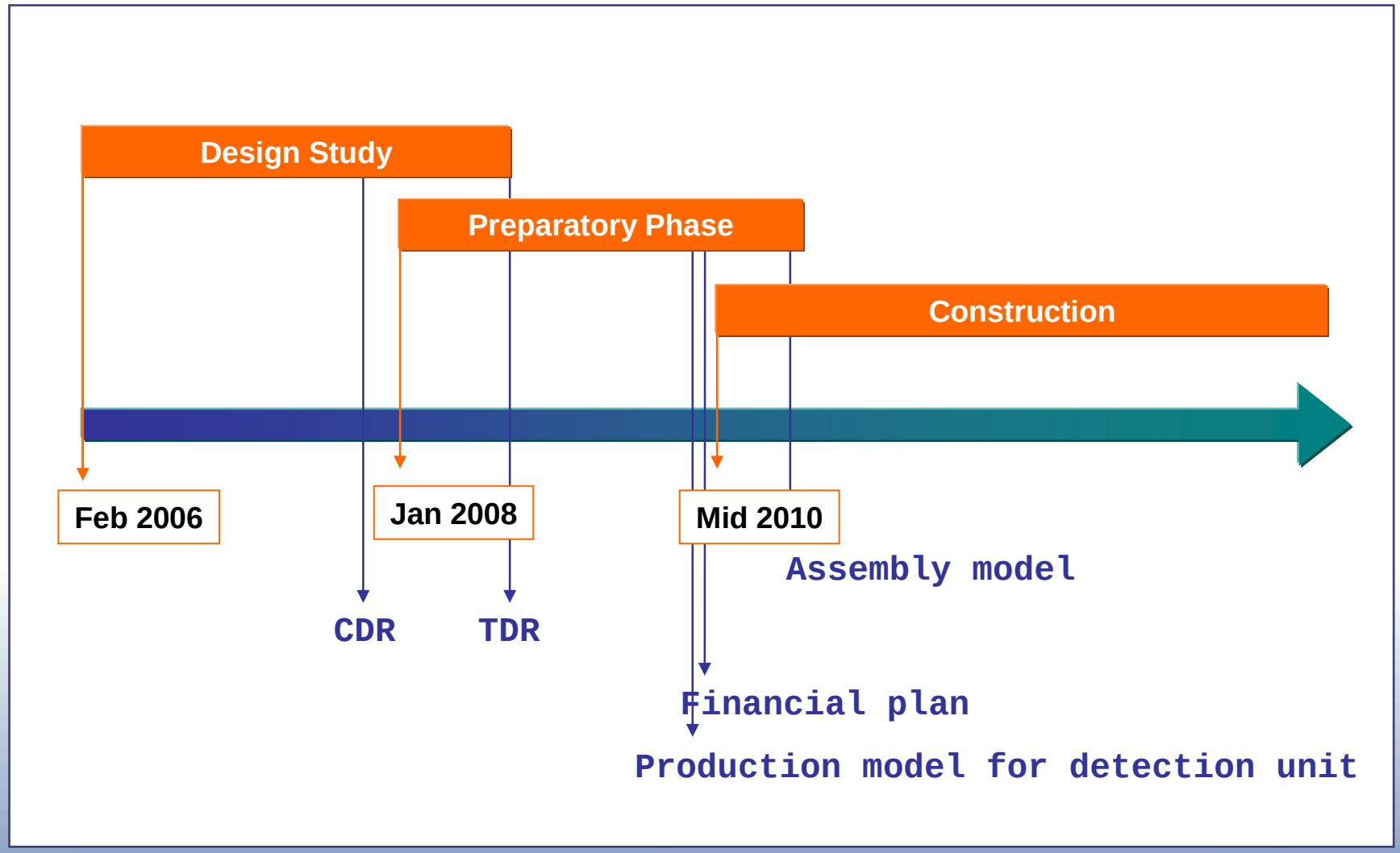
Method
Source caracteristics
Kappes A. et al. Astrophys. J., 656, 2007
Results
After oscillation



Name
Vela X
RXJ1713.7
RXJ0852.0

Ref. ICRC0865, J. Carr et al

Foreseen KM3NeT profile



Summary

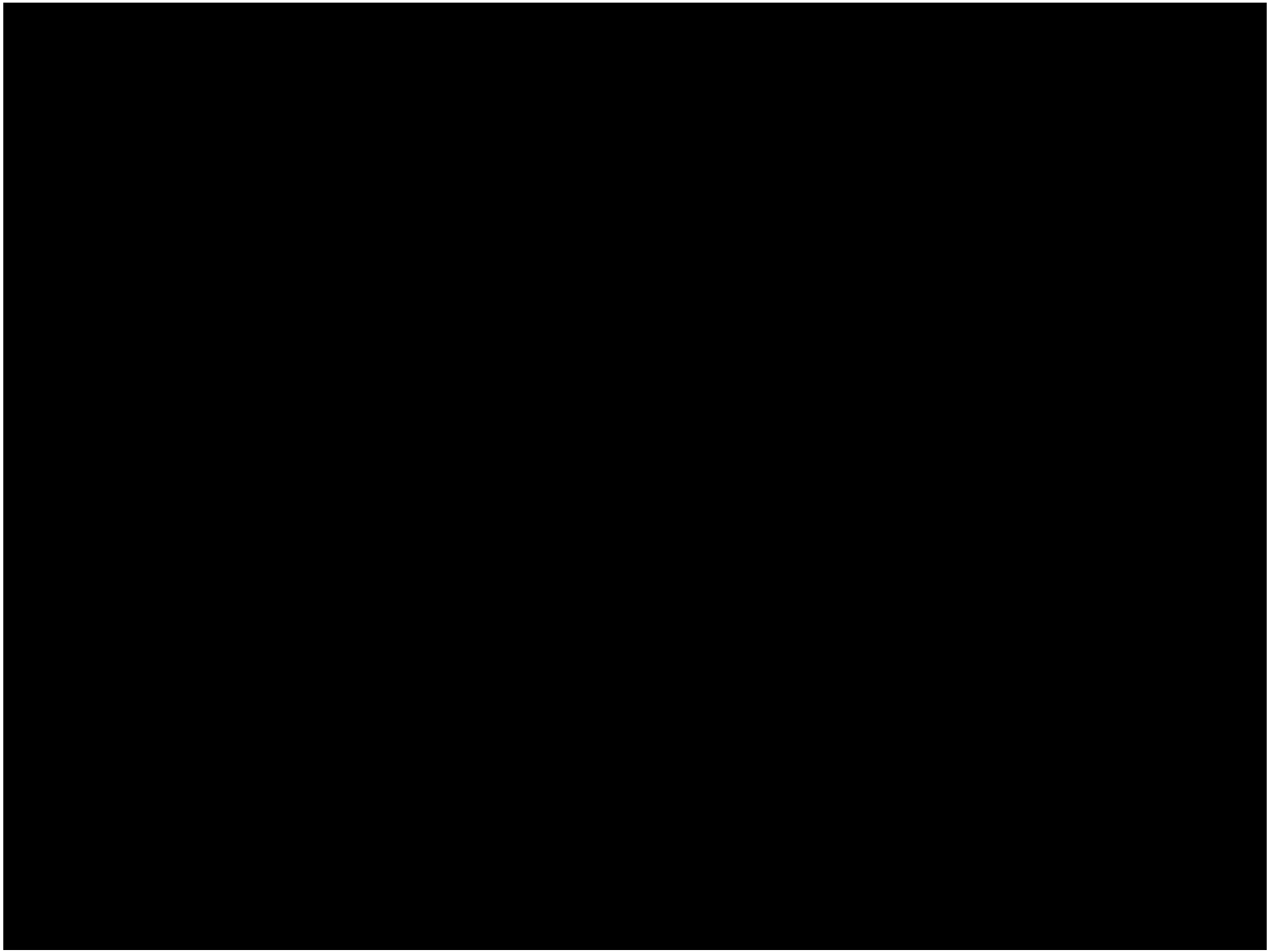
KM3NeT is well on its way

Building on experience of existing telescopes
CDR workshop in November 2007

Complete chain of simulation

Event generator
Analysis tools
Astro sources
Preliminary cost model

First analysis with GRBs and AGNs seem encouraging for the future.
(Ref. ICRC1067, R. White)

Next steps

Site selection
Optimisation of the effective area / price
International funding to build a few km^3 telescope