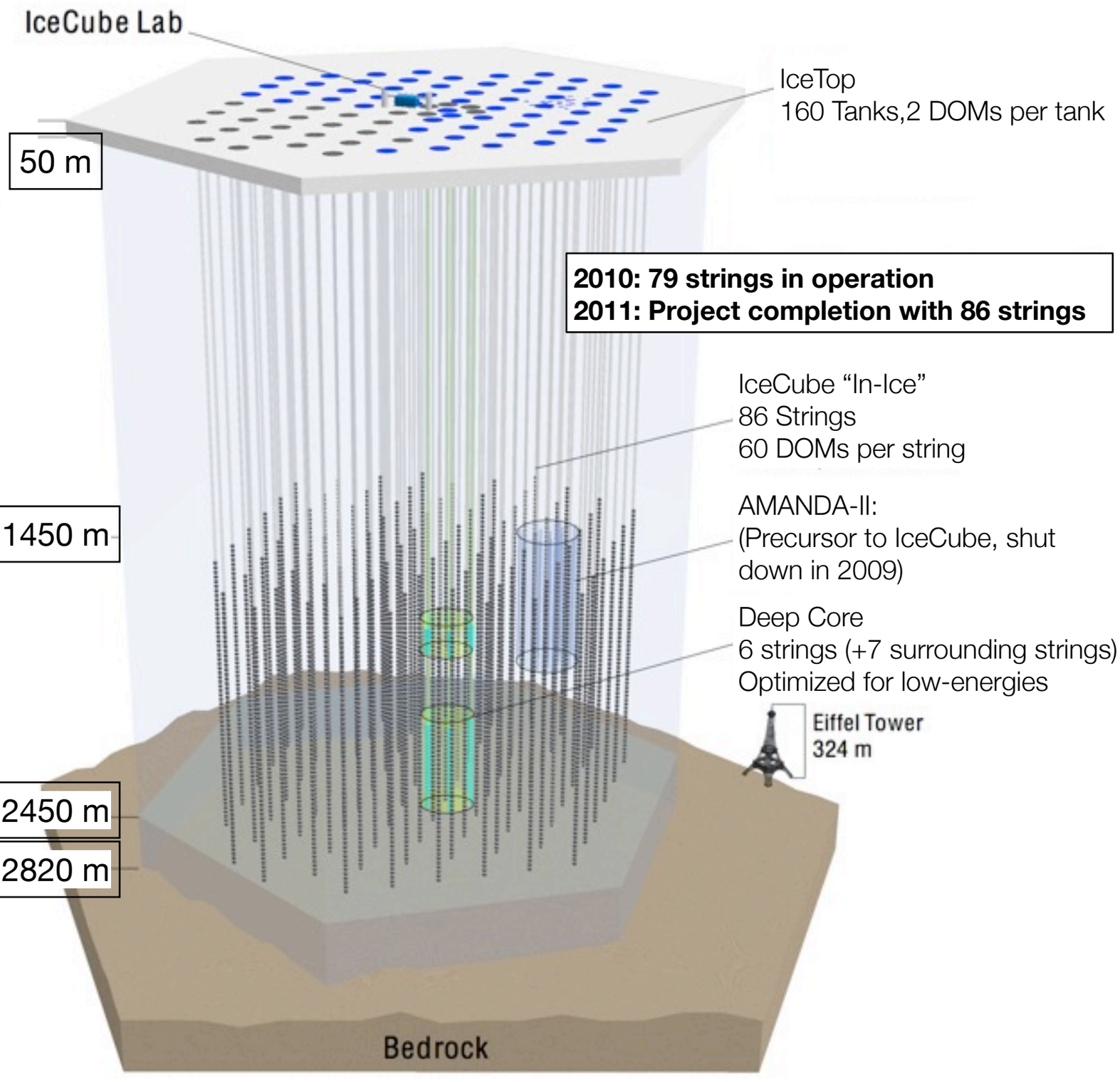
# IceCube Updates for SNEWS

Supernova Working Group
Neutrino 2010

# The IceCube Neutrino Observatory

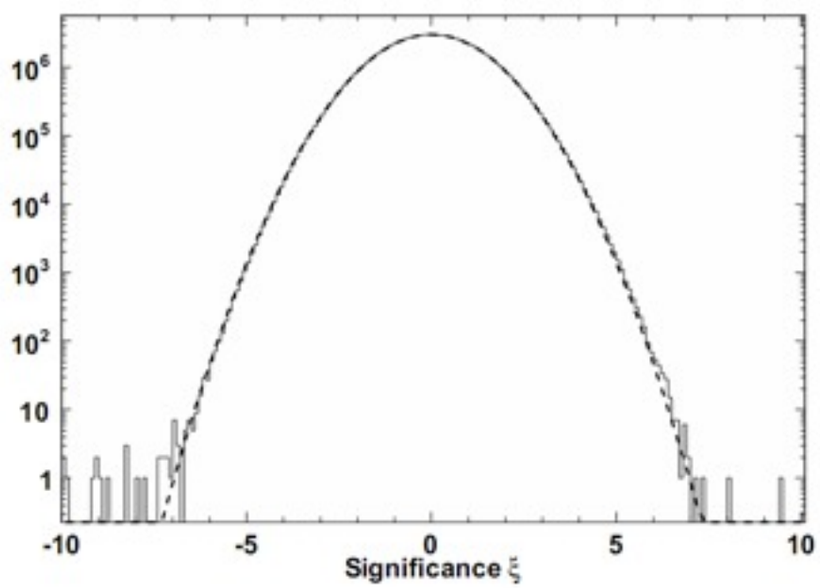
- 1km$^3$ instrumental volume
- 59 Strings deployed in 5 yrs
- 86 Strings by 2011
  - 80 strings ~ 125 m apart
  - 60 DOMs/string at 17 m vertical spacing
  - 6 special strings, 62 m apart, 7 m vertical spacing (high QE PMTs)
- Deep Core: 6 high-QE + 7 nearest standard strings



From poster by R. Maruyama

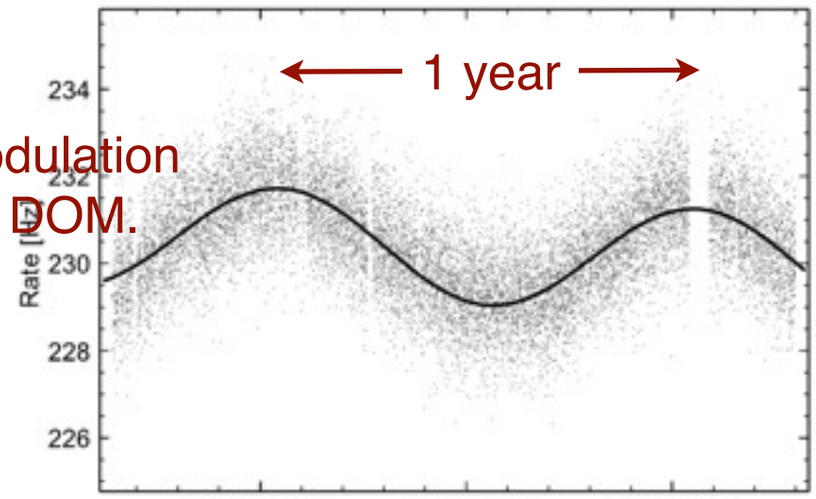
# Detector Performance

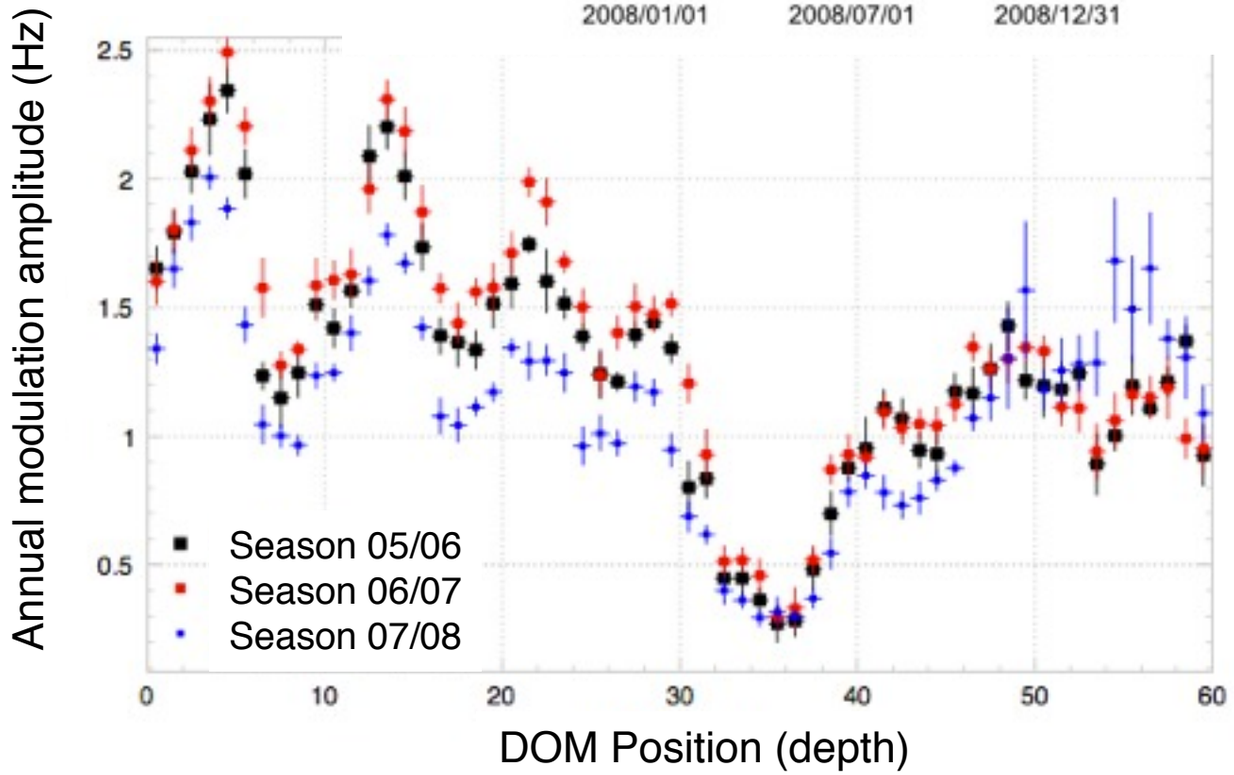
- Uptime (2009): 97%
- Functioning DOMs: 98%
- Single DOM noise rate: ~280 Hz
- Noise rate fluctuation consistent with statistical + fluctuation due to atmospheric muons




Distribution of the significance of rate fluctuation in 0.5 s binning for a detector uptime of 556 days

Annual muon rate modulation is visible in a single DOM.




Dust layers visible in single DOM rate

# Summary of Recent Activities

- Construction of IceCube to finish in December 2010 (79 / 86 deployed)
  - 20 Strings deployed in 2009/2010, 7 more in December 2010
  - SNEWS alert rate with the 20 new strings being mornitored and adjusted
  - AMANDA is now decommissioned
- Online monitoring
  - New point-of-contact for SNEWS: Gösta Kroll @ Mainz
  - Overhaul of online analysis for better reliability and ease of maintenance
  - Possitive response from recent IceCube internal review of supernova system.
    - An internal “fire drill” will be designed and conducted to test the end-to-end response.
- Sensitivity of IceCube to MeV neutrinos
  - IceCube’s sensitivity corresponds to a Mton scale detector for galactic supernovae.
  - Sensitivity reach exceeds 200, 20, and 6 standard deviations at the galactic center (10 kpc), the galactic edge (30 kpc), and the Large Magellanic cloud (50 kpc) respectively.
  - With 2 ms timing resolution, the IceCube detector can detect subtle features in the temporal development of the neutrino flux.
  - The slope of the rising neutrino flux following the collapse can be used to distinguish the neutrino mass hierarchies.
  - The deleptonization peak can be detected by IceCube provided that the supernova is close enough.