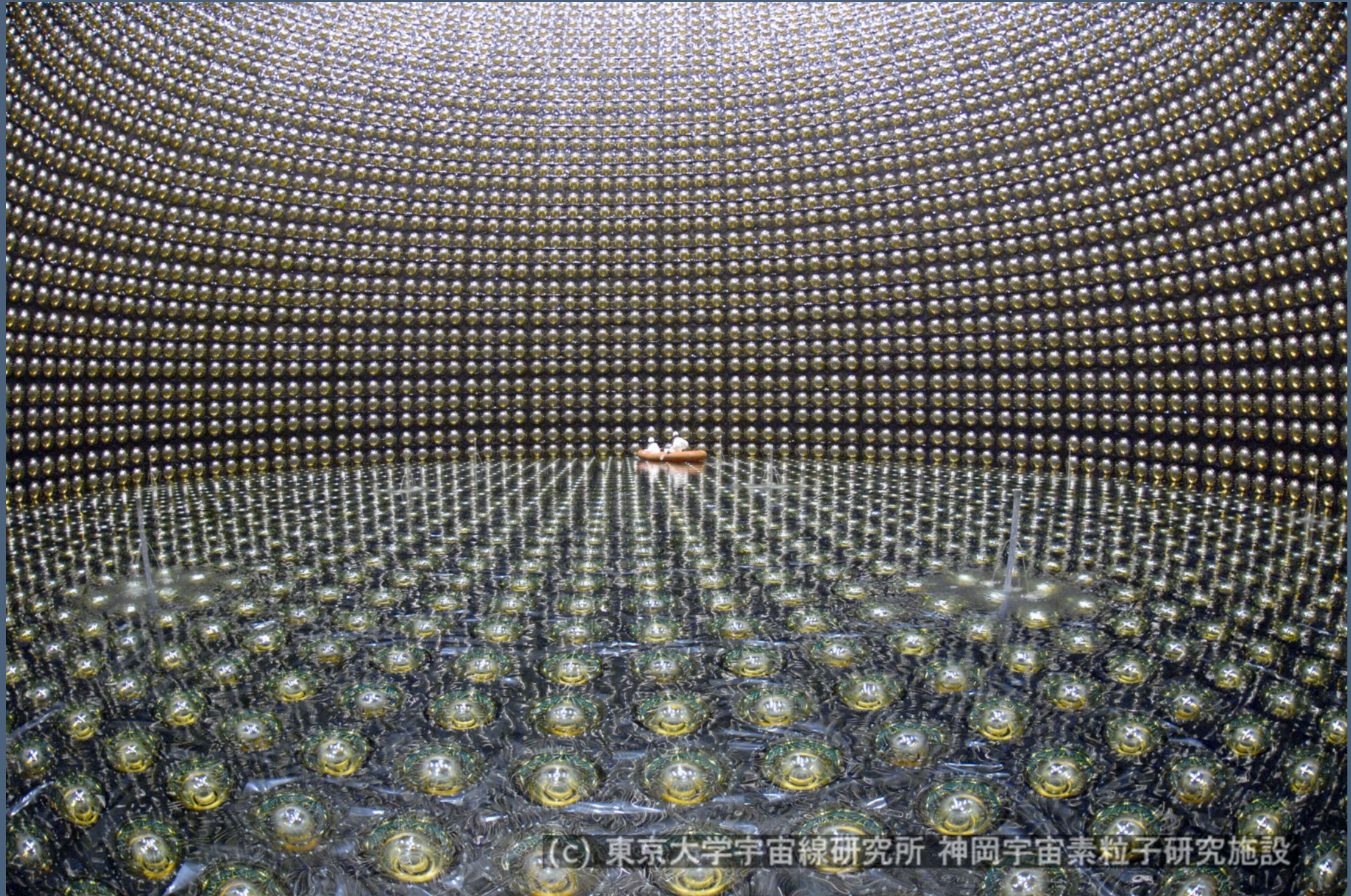


Neutrino Physics: Theory and Experiments

Lecture 3: SN and atmospheric neutrinos

Christian Buck, Apr 30th, 2025

Superkamiokande Detector

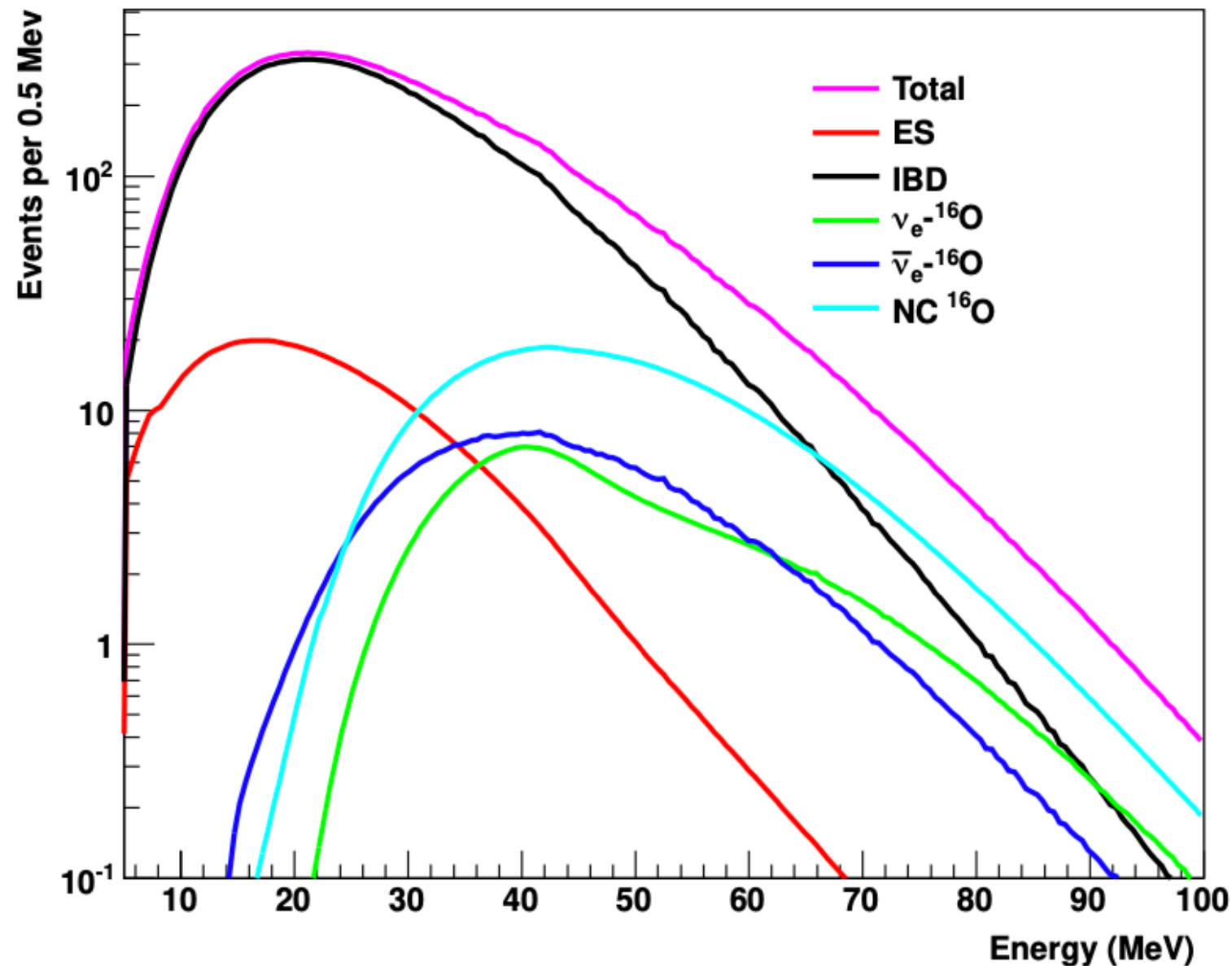


(c) 東京大学宇宙線研究所 神岡宇宙素粒子研究施設

<https://www-sk.icrr.u-tokyo.ac.jp/en/sk/about/detector/>

Cross sections

Rates for 100 kt water Cherenkov detector

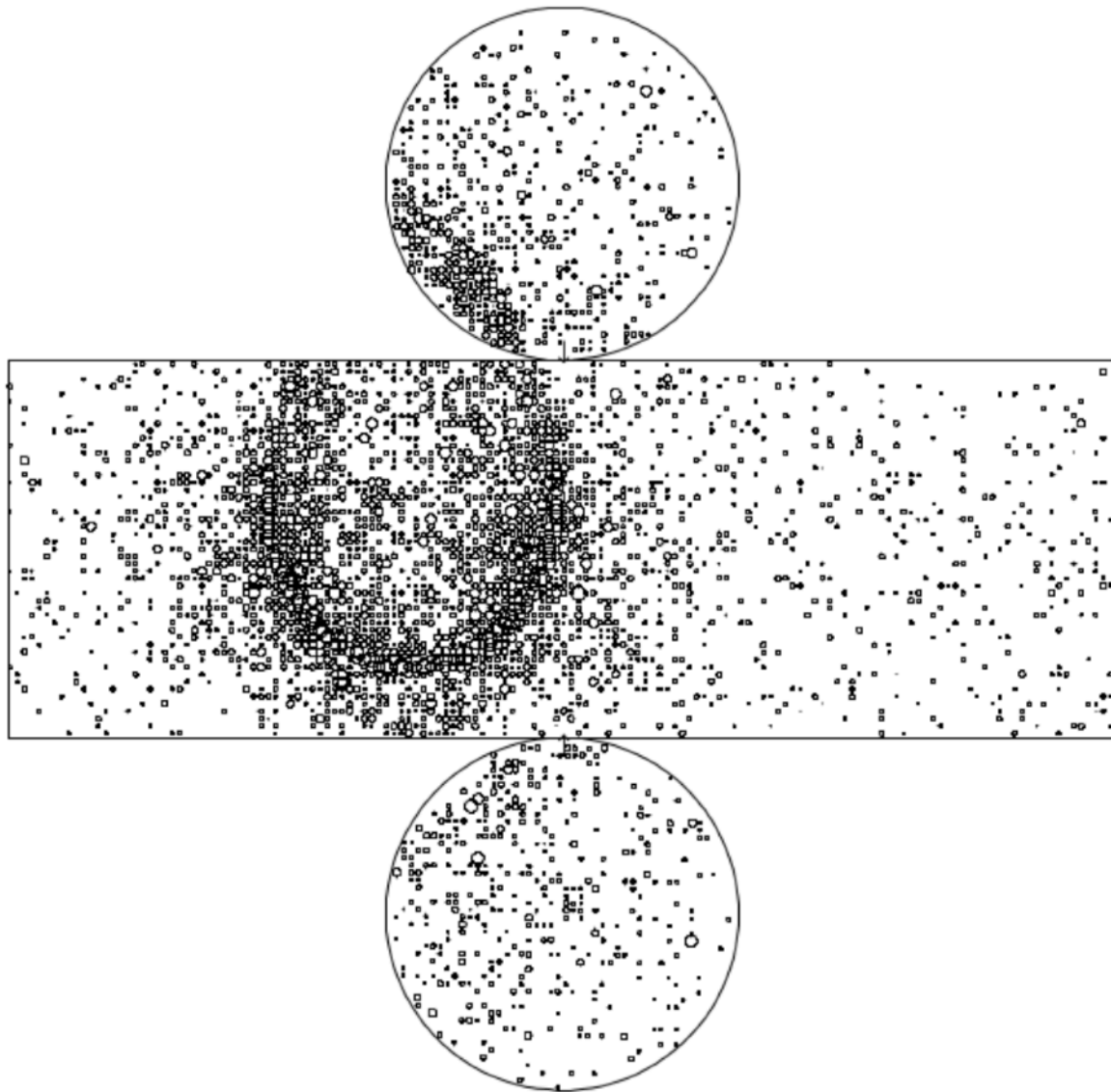


NC ^{16}O
reaction hard
to detect

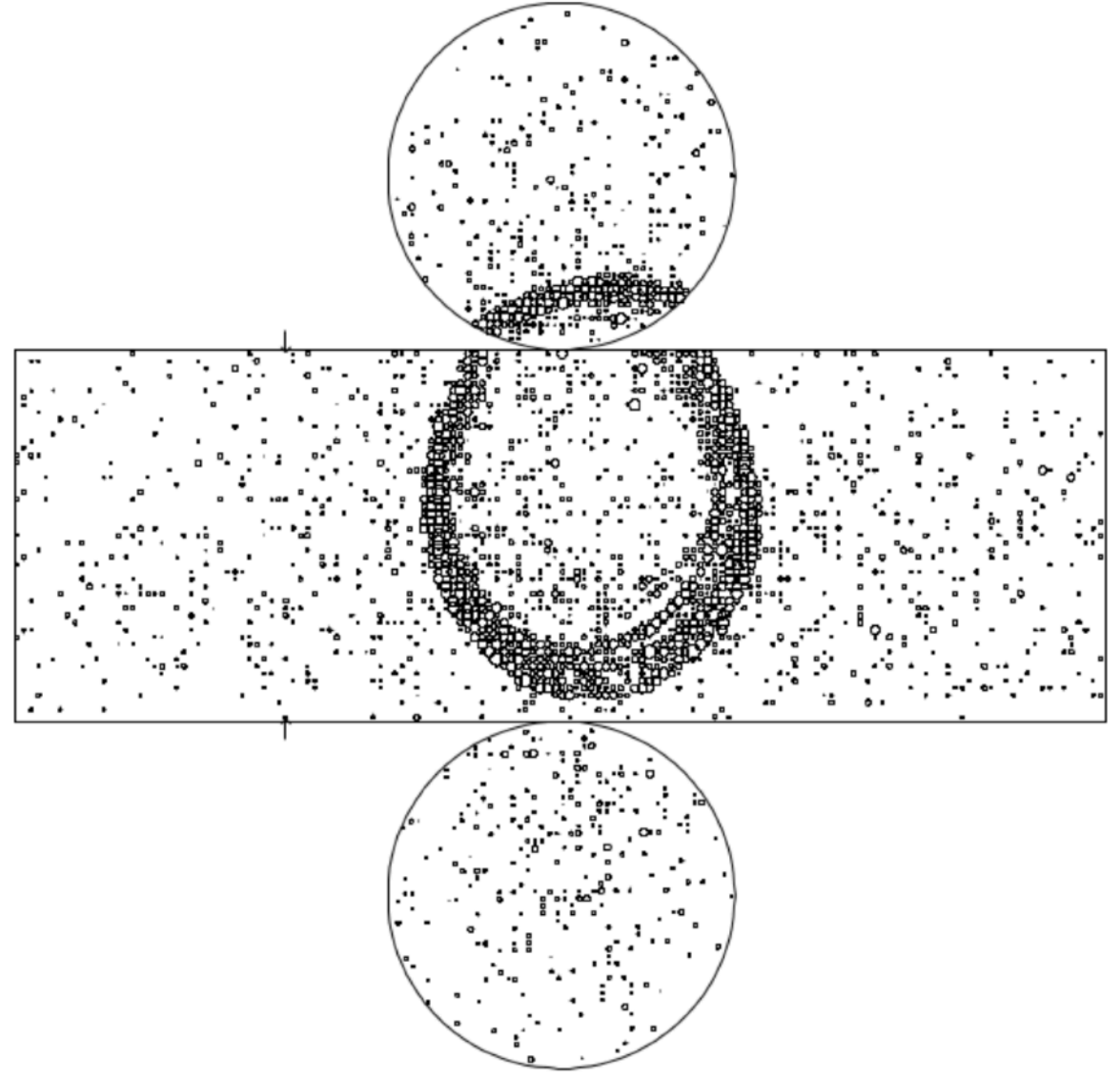
Particle identification

PMT charge signal

Electron-like event



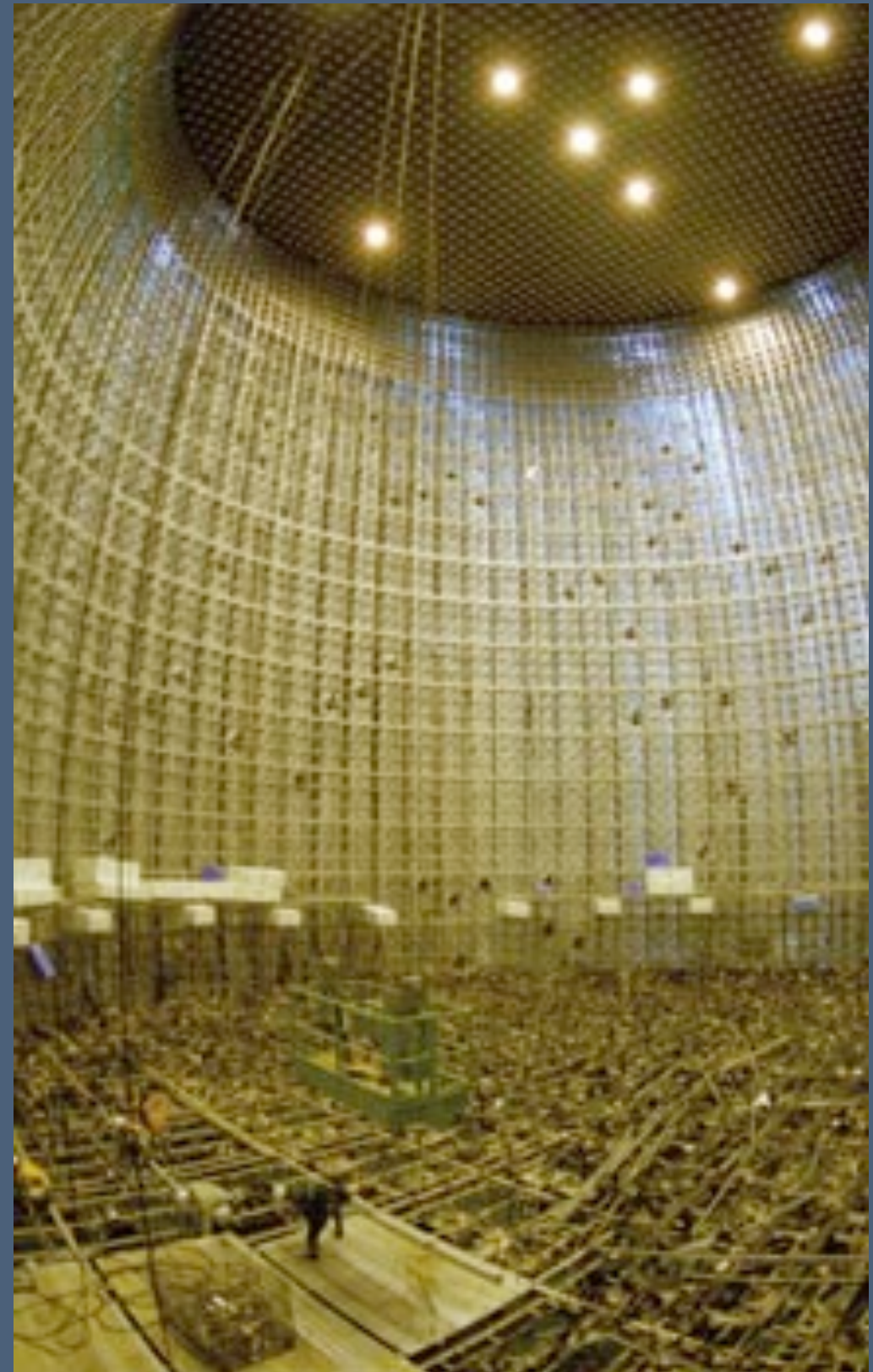
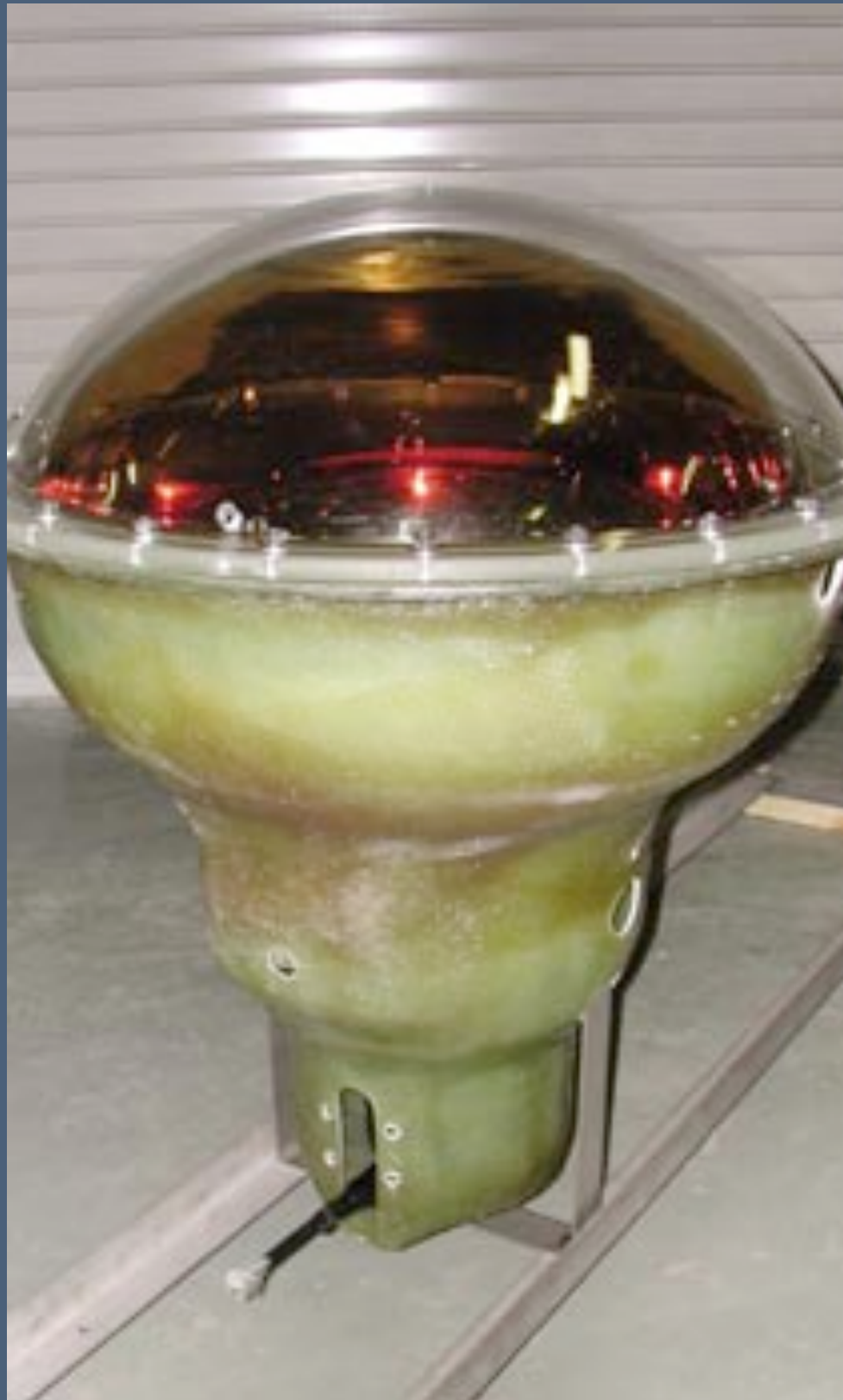
Muon-like event



<https://arxiv.org/pdf/hep-ex/0501064.pdf>

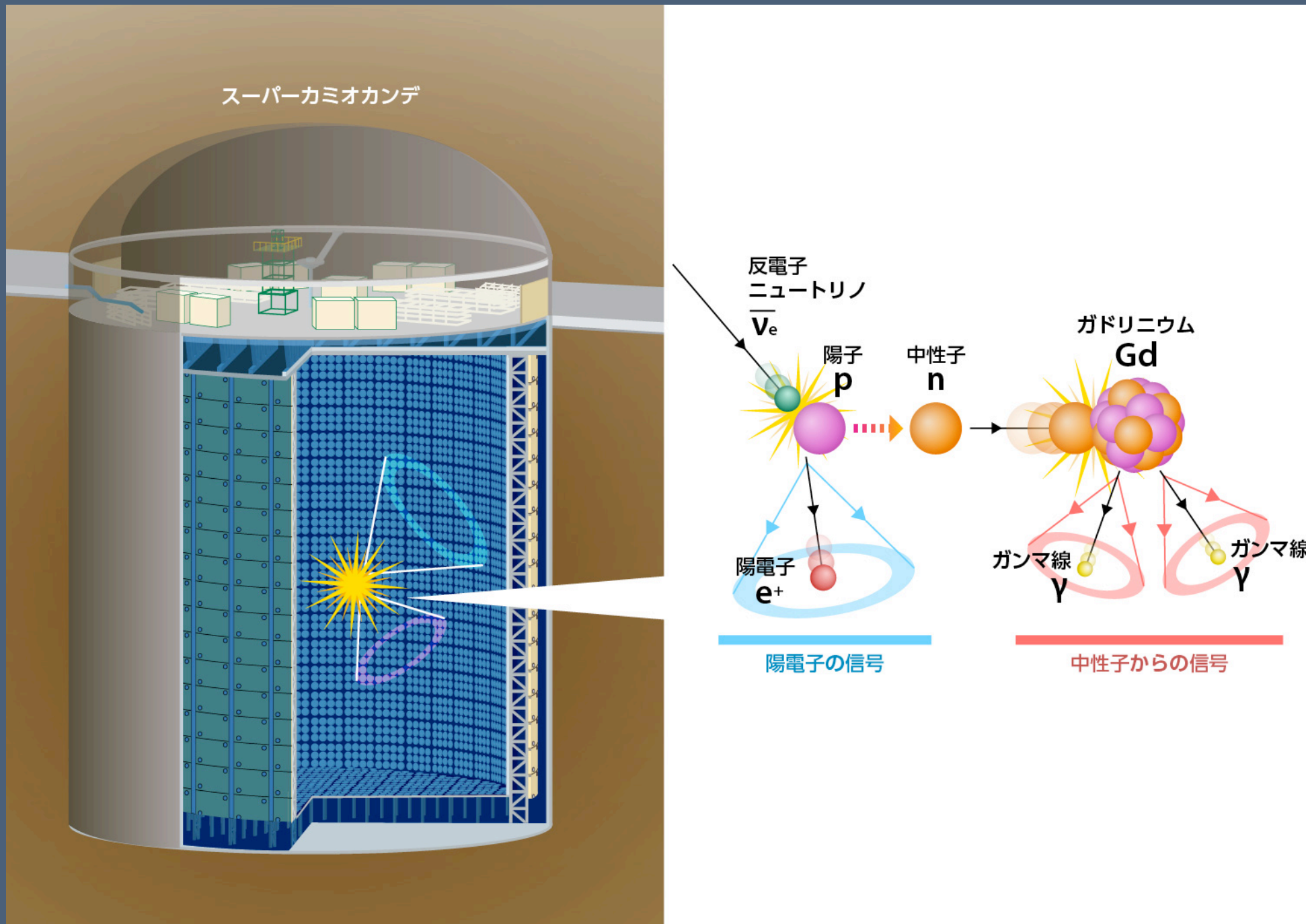
<https://www-sk.icrr.u-tokyo.ac.jp/realtime-monitor/>

Superkamiokande accident



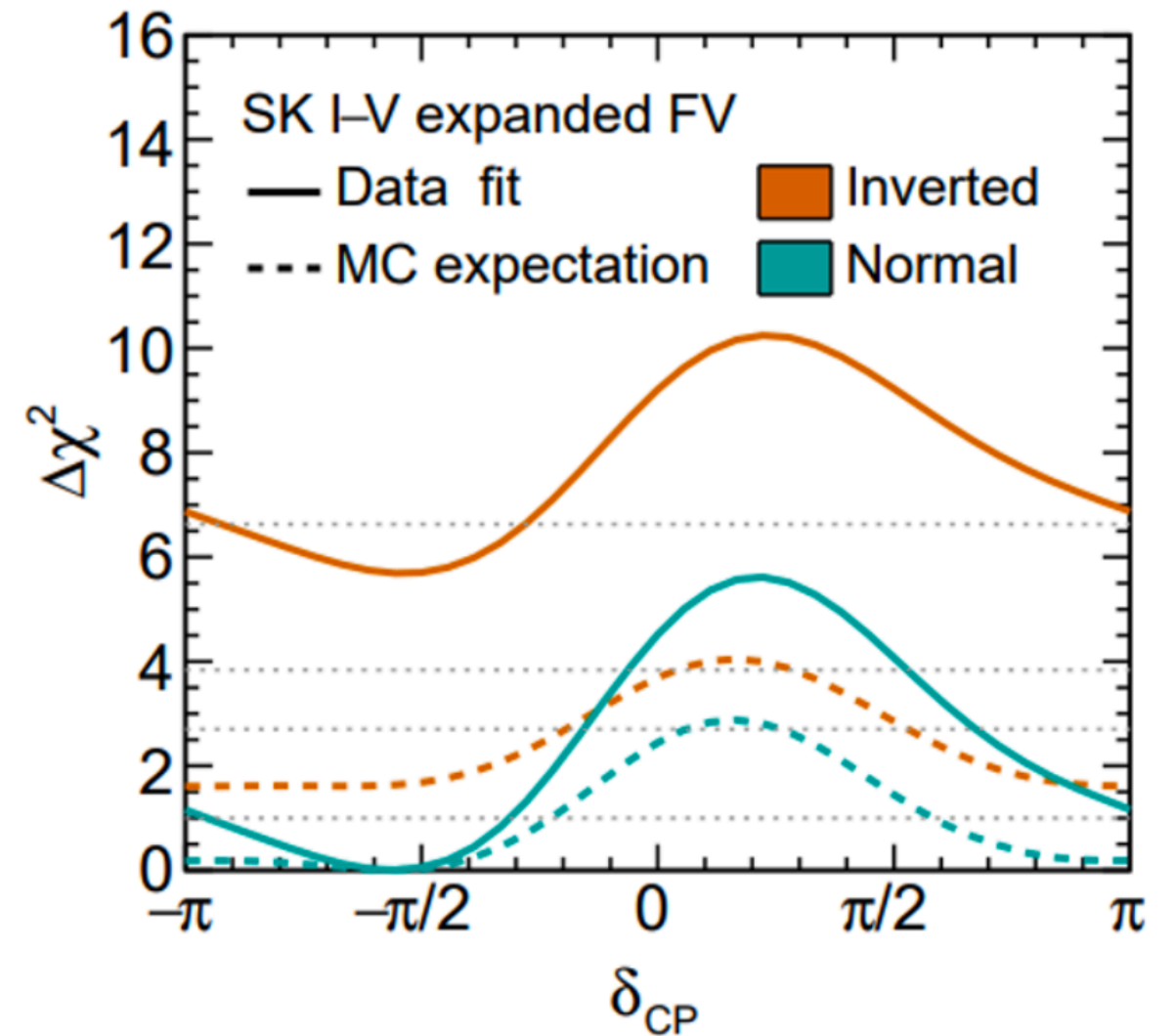
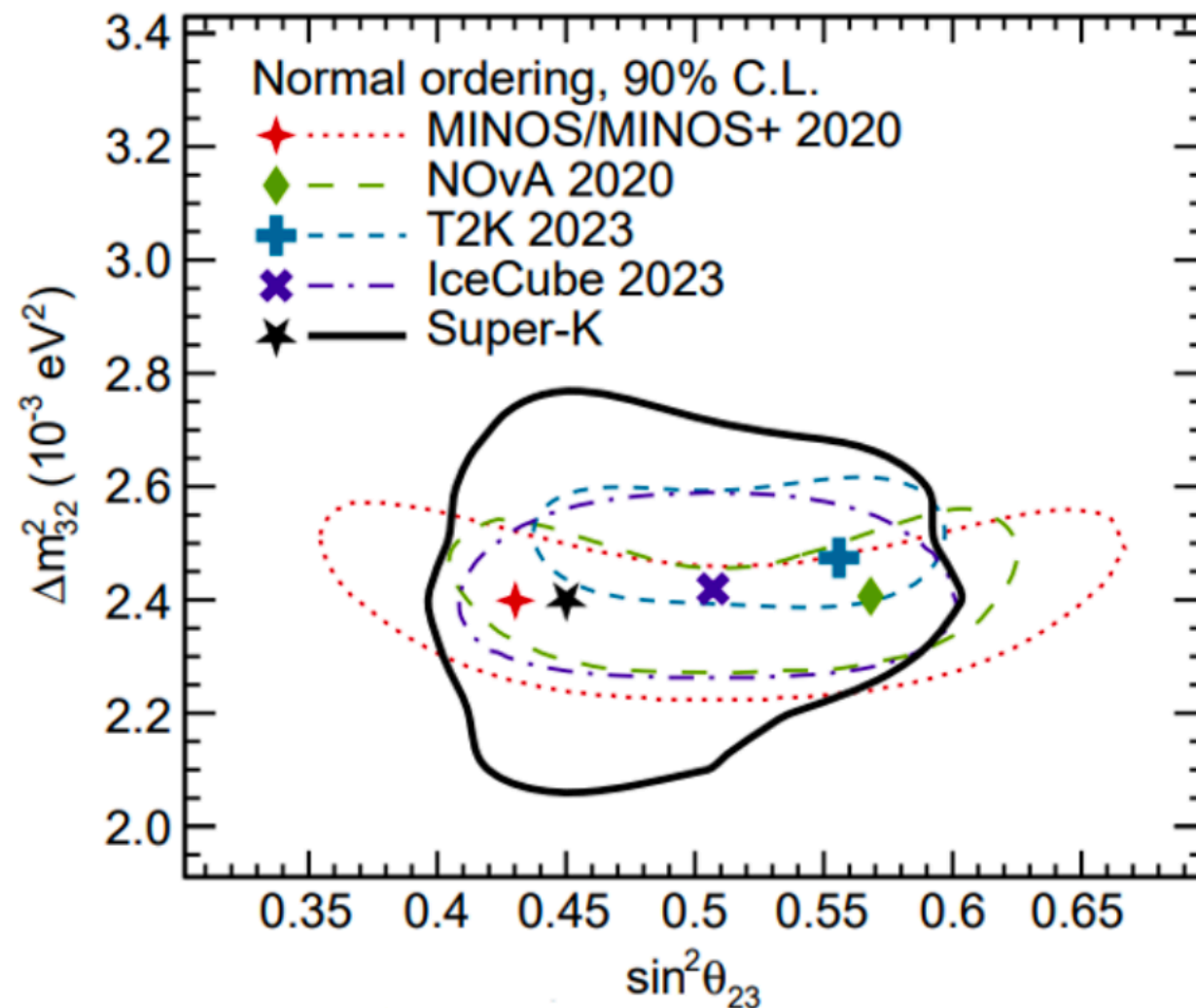
Gd-loading

Improve electron-antineutrino signature



Recent SK oscillation results

Atmospheric neutrino analysis



<https://arxiv.org/pdf/2405.07900>

Preference for normal hierarchy

Hyperkamiokande

Another factor 10 in mass!

