

Is DUNE, DONE?

This is a talk to promote BSM phenomenology
model exploitation within the DUNE experiment

Teppei Katori
King's College London
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DUNE is optimized for accelerator-based neutrino oscillation experiment

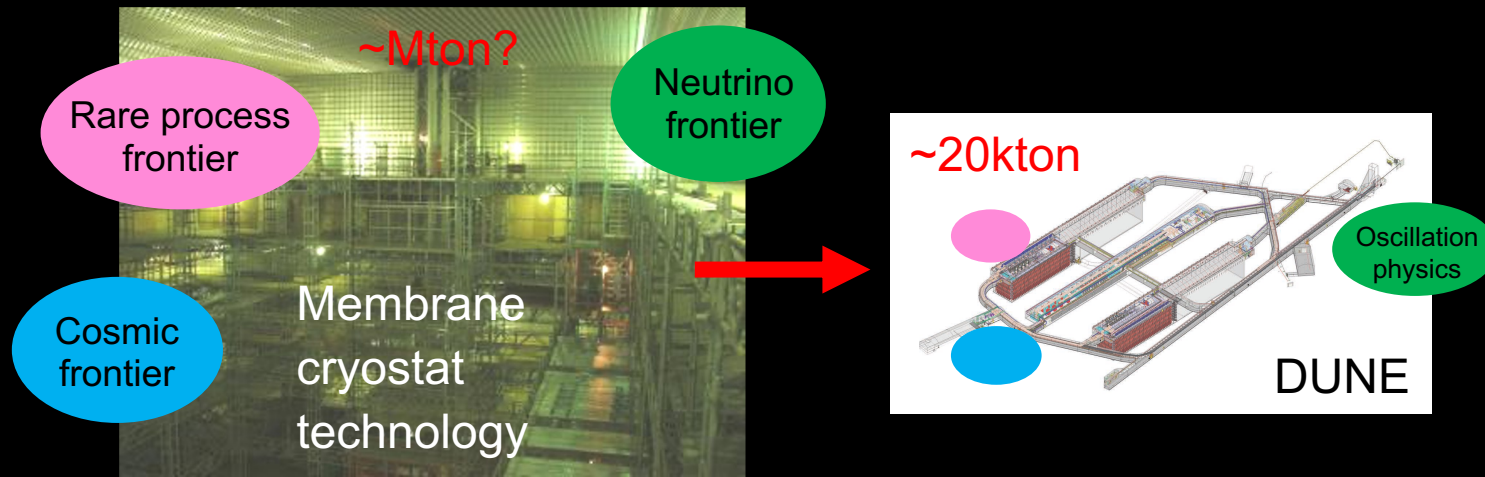
Beam energy is lower than TeV machines

Baseline is shorter than atmospheric neutrinos

Fiducial volume is smaller than neutrino telescopes

Any new physics if the energy, baseline, and fiducial volume are the key parameters, DUNE is not competitive

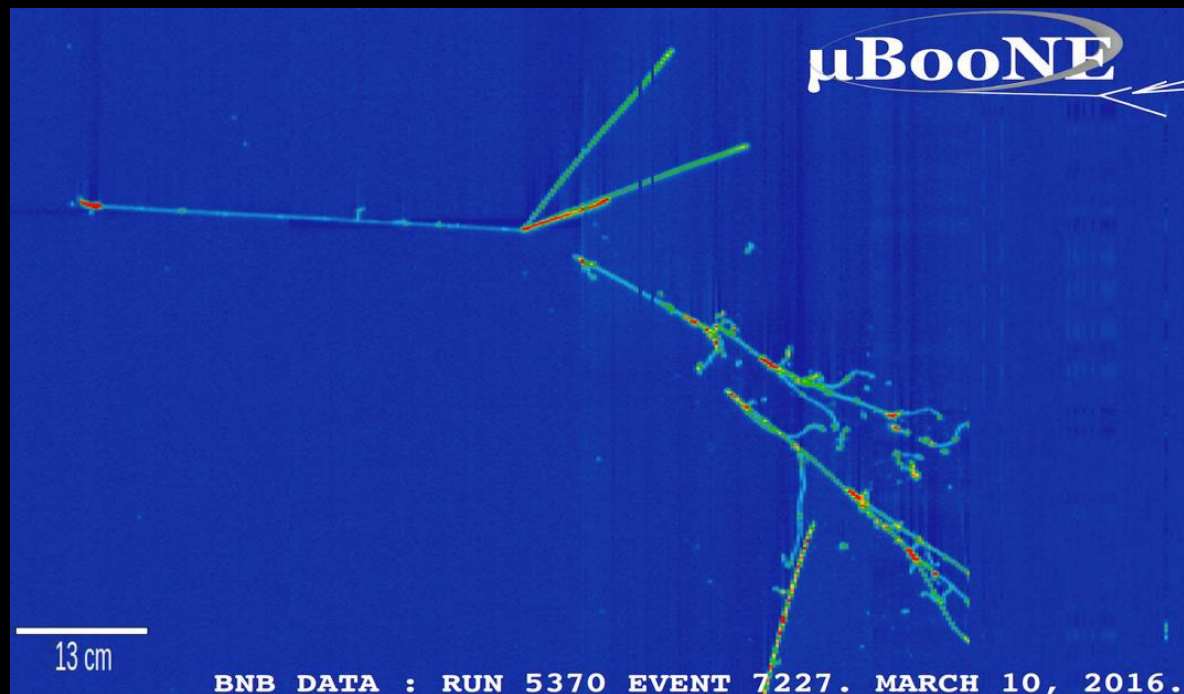
- Traditional energy frontier physics
- Traditional astrophysical and rare process researches



LArTPC: high spatial resolution large fully active detector

LArTPC offer many new observables, that can compensate lack of data (due to low event rate of neutrinos)

- New track features: Coulomb scattering, dE/dx , delta ray, etc
- New shower features: shower development, gap, etc
- New vertex features: de-excitation, vertex activity, etc



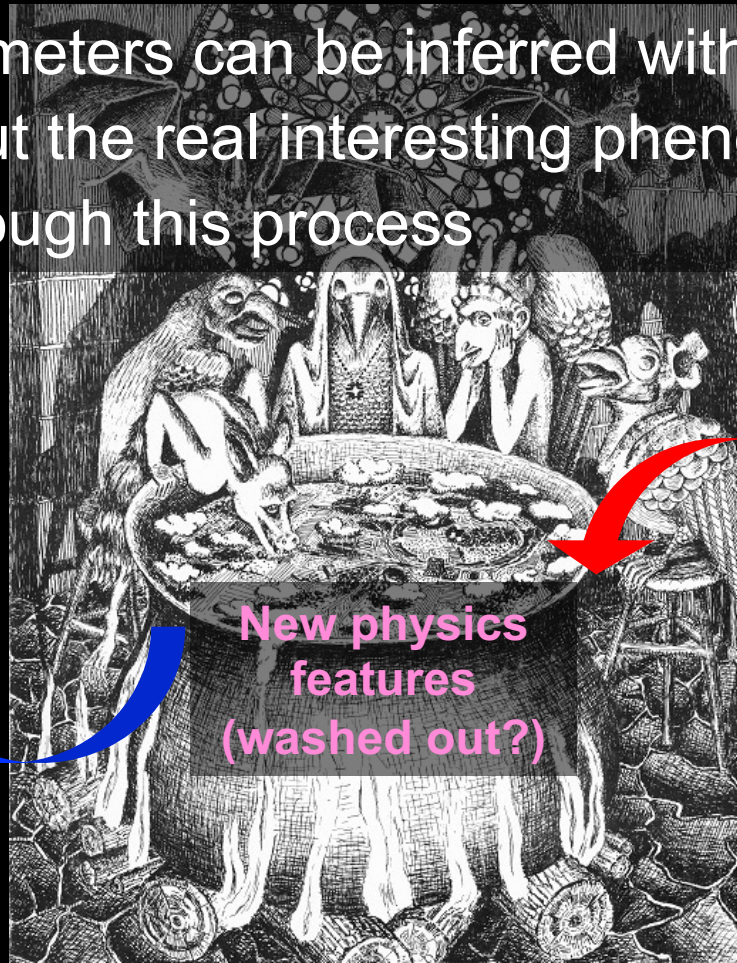
Neutrino experiment: fixed target experiment with unknown incoming beam energy

Neutrino interaction kinematics is incomplete

Kinematic parameters can be inferred with uncertainty from observables. But the real interesting phenomena may be washed out through this process

Inferred parameters

- Neutrino energy
- Q^2 , W , x , y , etc



New physics features
(washed out?)

Observables

- Lepton energy
- Lepton scattering angle
- Hadron multiplicity, etc

Recommendation: BSM Phenomenology model study with LArTPC neutrino detector specific observables

DUNE is optimized for accelerator-based oscillation experiment with LArTPC technology.

LArTPC is offering new observables. BSM phenomenology models should explore observables (phenomena), not only physics based on inferred kinematics (E_ν , Q^2 , etc)

Many BSM phenomenology models in the market don't require LArTPC-specific observables and no advantage for DUNE to pursue. Large part of DUNE science phase space is not explored by theorists, and exciting opportunities may be there

Thank you for your attention!