

Elements of the Supporting Programme

- Needs
 - Neutrino beam predictions
 - Neutrino interaction modelling
 - Detector R&D
 - Simulation
- Role of labs

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- Neutrino Beam Predictions

- Need hadron production measurements for each neutrino beamline
 - Need thin & thick targets, π^\pm and K^\pm measurements

- Neutrino Interaction Modelling

- See Jan and Sam's slides

- Detector R&D

- Major development ongoing for FDs
- For “NDs”, need a wide range of nuclear targets
 - Difficulty of modelling nuclear environment & final-state-interactions (FSI) necessitates broad coverage of A
 - Need to lower momentum threshold for particle tracking
 - ➡ Probably not sufficient to build many LAr detectors
 - ➡ High pressure gas TPC

- Simulation tools

- See slides by Andre & Michele (?)

HPTPC CC Event rates

per 10^{21} POT

| Gas | mass, 10 m ³ at 5 bar | J-PARC (0.6 GeV) | FNAL (2-3 GeV) |
|-----------------|----------------------------------|------------------|----------------|
| He | 8.21 kg | 5.48E+02 | 1.88E+04 |
| Ne | 41.4 kg | 2.75E+03 | 9.42E+04 |
| Ar | 81.9 kg | 5.47E+03 | 1.88E+05 |
| CF ₄ | 181. kg | 1.21E+04 | 4.14E+05 |

J-PARC flux from T2K flux release, FNAL flux from Sam Zeller (~2 years ago).
Event rates calculated in a consistent manner.

Role of Labs

- CERN -->Neutrino Platform
 - Primarily for neutrino detector R&D
 - Bertolucci said it will be actively supported, and help WA104, WA105, and all other proposals approved by the SPSC
 - building a large neutrino test area (EHN1 extension) with charged beam capabilities that will be available in 2017
 - Also can continue support for hadron production experiments
- Fermilab (Neutrino Platform?)
 - Good test beam facilities (LARIAT etc.)
 - Hadron production
- J-PARC
 - ND280 hall could house new/different experiments
- *Homework still to be done*



**Thank you for your
attention!**

ご清聴ありがとうございました

水戸の梅の花

HPTPC WG Goals

Legend

✓ same for HK and DUNE

- different for HK and DUNE

- Physics

- ✓ Broadly: explore utility of HPTPC as a near detector in LBL experiments
- Determine performance needs for accurate interaction measurements at ~1 GeV and ~3 GeV
 - Address physics issues needed for 1-2% systematics

- Technology

- ✓ Compile data base of existing, useful gas measurements; create list of needed measurements
- ✓ Explore performance capabilities and costs of different readout technologies
- ✓ Vessel design questions

- Software/Simulation

- ✓ Create a software toolbox suitable for simulation and analysis of generic HPTPC detector physics
 - ✓ use existing/standard packages wherever possible (such as GEANT)
- Couple HPTPC detector MC to a full oscillation fit, suitable for both HK and DUNE (probably separate efforts, maybe not addressed by HPTPCWG)