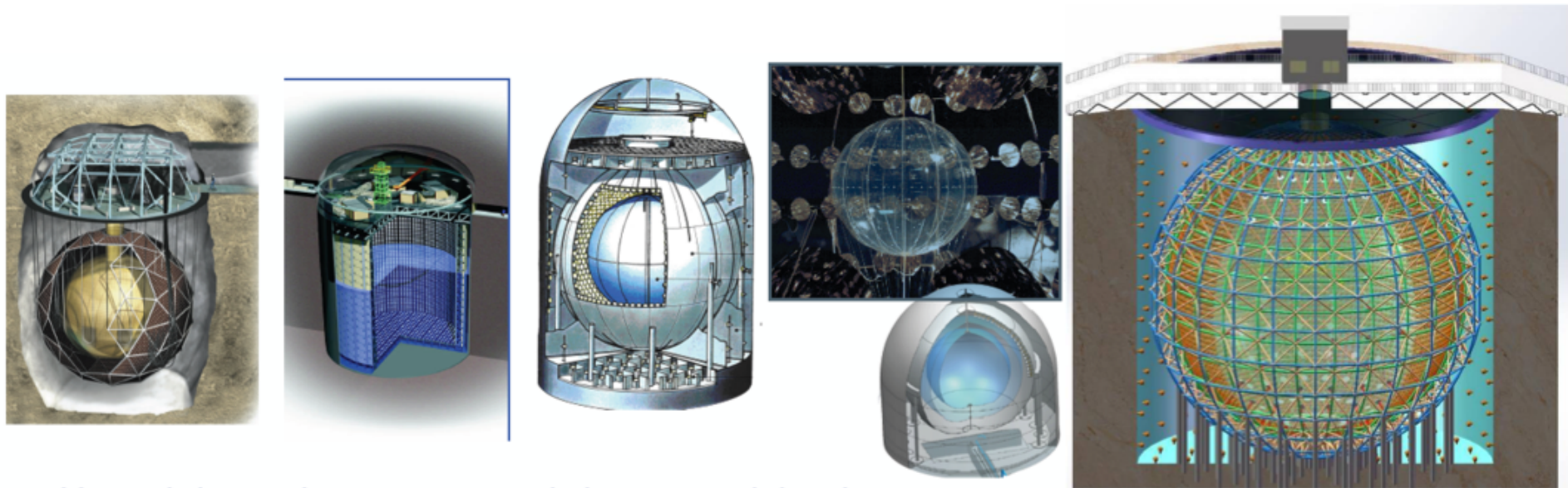




Welcome to the 4th Theia Workshop

April 12-14, UC Davis

Development of Large Optical Detectors have ushered in a new era of Neutrino Physics



Large size for cost, fast timing for background reduction, low threshold, **reconfigurable as the field progressed**

Series of THEIA Workshops

March 2016



THEIA “Interest Group” formed with concept paper:

Advanced Scintillator Detector Concept (ASDC): [arXiv:1409.5864](https://arxiv.org/abs/1409.5864)
A Concept Paper on the Physics Potential of Water-Based Liquid Scintillator

J. R. Alonso,¹ N. Barros,² M. Bergevin,³ A. Bernstein,⁴ L. Bignell,⁵ E. Blucher,⁶ F. Calaprice,⁷ J. M. Conrad,¹ F. B. Descamps,⁸ M. V. Diwan,⁵ D. A. Dwyer,⁸ S. T. Dye,⁹ A. Elagin,⁶ P. Feng,¹⁰ C. Grant,³ S. Grullon,² S. Hans,⁵ D. E. Jaffe,⁵ S. H. Kettell,⁵ J. R. Klein,² K. Lande,² J. G. Learned,¹¹ K. B. Luk,^{8,12} J. Maricic,¹¹ P. Marleau,¹⁰ A. Mastbaum,² W. F. McDonough,¹³ L. Oberauer,¹⁴ G. D. Orebi Gann*,^{8,12,†} R. Rosero,⁵ S. D. Rountree,¹⁵ M. C. Sanchez,¹⁶ M. H. Shaevitz,¹⁷ T. M. Shokair,¹⁸ M. B. Smy,¹⁹ A. Stahl,²⁰ M. Strait,⁶ R. Svoboda,³ N. Tolich,²¹ M. R. Vagins,¹⁹ K. A. van Bibber,¹⁸ B. Viren,⁵ R. B. Vogelaar,¹⁵ M. J. Wetstein,⁶ L. Winslow,¹ B. Wonsak,²² E. T. Worcester,⁵ M. Wurm,²³ M. Yeh,⁵ and C. Zhang⁵

50 authors, 23 institutions, lots of experience: Borexino, DUNE, KamLAND, SNO, Double CHOOZ, SNO+, Daya Bay, LENA, KamLAND-Zen, MiniBOONE, Super-Kamiokande, WATCHMAN, ANNIE, T2K....



October 2016



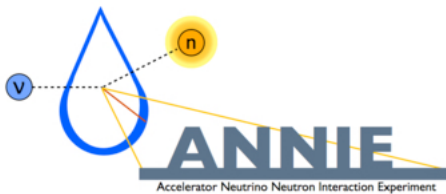
FroST - Topical Workshop for THEIA

March 2017



Decided to form proto-collaboration to coordinate R&D on international scale: Canada, China, Finland, Germany, Portugal, UK, USA thus far

ANNIE Ready for Phase II with LAPPDs



WATCHMAN

(WATER Cherenkov Monitor for ANTineutrinos)

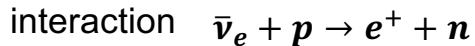
Main Project Objective:

Detect the ON/OFF power cycle of a single reactor:

- at 10-25 km standoff
- with a kiloton-scale Gd-H₂O detector

Technology Demonstration:

Doping water with gadolinium greatly increases sensitivity to antineutrinos in the inverse beta interaction



HARTLEPOOL REACTORS

- 2 cores
- 1570 MWt per core
- 25 km standoff

WATCHMAN detector at the Boulby mine

- 3500 tons, ~3000 photomultiplier tubes
- Water Cherenkov detector, doped with gadolinium
- Detects antineutrinos via the process $\bar{\nu} + p = e^+ + n$



The Advanced Instrumentation Testbed (AIT) at the Boulby Underground Lab

- The Advanced Instrumentation Testbed (AIT) will pursue enhanced capabilities for monitoring nuclear reactors. AIT will permit R&D into detection media, photodetectors, methods and algorithms.
- **This includes technology important for THEIA, i.e. Water-based Liquid Scintillator for possible future deployment as WATCHMAN upgrade.**



- If all approvals are secured, AIT will be located at the Boulby mine, as part of the existing Science and Technology Funding Council (STFC) Boulby Underground Laboratory in the U.K.

Please upload your talk: or see Leon



Theia workshop

12-14 April 2018
University of California, Davis
US/Pacific timezone



Overview

Timetable

Contribution List

Registration

Participant List

Accommodations

Travel Info

Where to eat

Committees

Contact

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Theia is a potential multi-purpose, large-scale neutrino detector in its very early design stages. It aims to utilize water-based liquid scintillator or lightly-doped oil as a detector medium coupled with very fast timing to study a broad physics program. Its prospects include the capability to detect and measure neutrinos over a very broad energy spectrum, with the potential to deduce the hierarchical nature of neutrinos, measure the level of CP violation in the lepton sector and potentially determine whether the neutrino is Majorana in nature. Furthermore, **Theia** will be able to study neutrinos from multiple sources including the Fermilab LBNF beam, atmospheric neutrinos, the Earth, the Sun, galactic supernovae, and the diffuse flux of cosmological supernova neutrinos.

Please send the title of your talk to vfischer@ucdavis.edu



Starts 12 Apr 2018, 09:00

Ends 14 Apr 2018, 13:00

US/Pacific



University of California, Davis



[Robert Charles Svoboda](#)

[Jingbo Wang](#)

[Vincent Fischer](#)

[Leon Pickard](#)

[Gabriel Orihi Gana](#)



There are no materials yet.



Parking: \$9/day in pay lot



Lunch: Assortment of Box Lunches will be delivered

Jingbo will collect \$15/day for Lunch Thursday and Friday

Please give him cash and he will give you a receipt

Dinner

