

Opening Remark

Masato Shiozawa

Kamioka Observatory, Institute for Cosmic Ray Research, U of Tokyo, and
Kamioka Satellite, Kavli Institute for the Physics and Mathematics of the Universe (WPI), U of Tokyo

*Open Hyper-K Meeting
July 20, 2014*

Freeman Dyson@Super-K, April-22, 2014

Thank you so much for the clear explanations
throughout the day. 7/3/13
Adi Shamir 28/11/2013

This is a great instrument
for exploring the universe. Now
it is time for HYPER

This is a great instrument
for exploring the universe. Now
it is time for HYPER-Kamiokande!
Freeman Dyson April 22

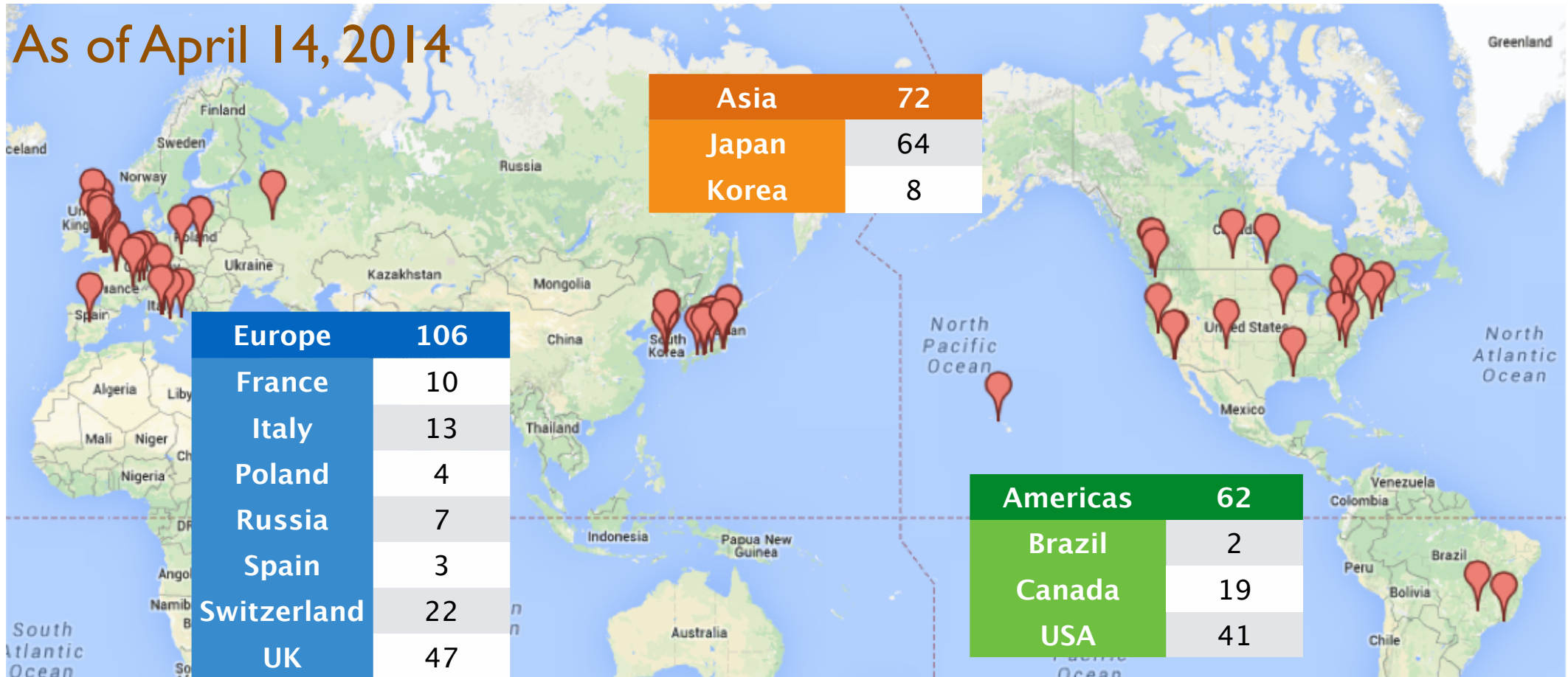
First general Hyper-K meeting outside of Japan

- In April of 2012, I visited TRIUMF **alone** to give a seminar on the Hyper-K project
- We have **~100 participants** (registrants) 2 years later today
 - 46 from Americas (Brazil, US, Canada)
 - 23 from Europe (France, Italy, Spain, Switzerland, Poland, UK)
 - 29 from Asia (Japan, Republic of Korea)

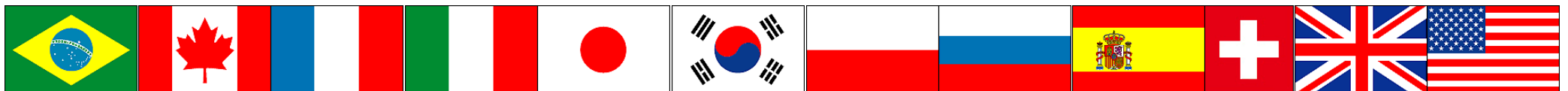
Thank you so much for
your participation

Hyper-Kamiokande International Working Group

As of April 14, 2014



12 countries, 67 institutes, 240 people



“BIG” questions in Snowmass

<http://www.symmetrymagazine.org/article/october-2013/the-big-questions>

- The **Higgs particle** is unlike any other particle we have ever encountered. Why is it different? Are there more?
- **Neutrinos** are very light, elusive particles that change their identity as they travel. How do they fit into our understanding of nature?
- The known particles constitute one-sixth of all the matter in the universe. The rest we call **dark matter**. But what is it? Can we detect these particles in our labs? Are there other undiscovered particles in nature?
- There are four known forces in nature. Are these manifestations of a **single unified force**? Are there unexpected new forces?
- Are there new **hidden dimensions** of space and time?
- Both **matter and antimatter** were produced in the big bang, but today our world is composed only of matter. Why?
- Why is the expansion of the universe accelerating?

oscillation,
supernova ✓

indirect
DM
search ✓

proton,
decays, ν 's
& mass &
mixing ✓

ν 's CPV,
proton
decays ✓

Hyper-K is the right direction to address many “BIG” questions.

Updated Hyper-K Working Group Organization

Steering Committee

Nakaya (chair)

Aihara, Nakahata, Shiozawa,
Yokoyama, **Kobayashi**

- ▶ oversee the HK group
- ▶ channel for contacting to the group
- ▶ involve non-japanese in future

International board of representative (IBR)

a few members from each countries

- ▶ represent each countries
- ▶ budget request in each countries

Project Leader

Shiozawa

- ▶ PL oversees the sub-WGs
- ▶ WG conveners may be composed of one Japanese plus some non-japanese.

WG1

Shiozawa,
Tanaka

WG2

Sekiya,
Vagins

WG3

Nakayama,
Nishimura

WG4

Hayato

WG5

Miura
Walter
F.D.Lodovico

WG6

HideTanaka,
HiroTanaka,
Koshio,Mine,
Mccauley

WG7

Hartz

Physics WG conveners

Yokoyama

WG1: Cavity and Tank

WG2: Water

WG3: Photo-sensor

WG4: DAQ

WG5: Software

WG6: Calibration

WG7: Beam & Near Detectors

Phys-WG1

Yokoyama

Phys-WG2

Wendell

Phys-WG3

Takeuchi

Phys-WG1: Accelerator

Phys-WG2: Atm ν +Nucleon decays

Phys-WG3: Astroparticle Physics (SN,
solar ν , etc)

1. IBR members 19 members

- Brazil : H. Nunokawa (Rio de Janeiro) **theorist
- Canada: S. Bhadra (York), A. Konaka (TRIUMF)
- France: M. Gonin (Ecole Polytechnique), M. Zitto (Saclay)
- Italy: M.G. Catanesi (INFN-Bari)
- Japan: T. Kobayashi (KEK), T. Nakaya (Kyoto), M. Shiozawa (ICRR)
- Korea: K.K. Joo (CNU)
- Poland: E. Rondio (NCBJ, Warsaw)
- Portugal: J. Maneira (LIP)
- Russia: Y. Kudenko (INR)
- Spain: L. Labarga (Madrid)
- Switzerland: A. Blondel (Geneva)
- UK: F. Di Lodovico (QM London), D. Wark (STFC, RAL-PPD, Oxford)
- USA: E. Kearns (Boston), C. Walter (Duke)
- (*) we also invite the Hyper-K WG steering members.

J-PARC PAC

- LBL sensitivity presented at May PAC meeting by Yokoayama-san
<http://kds.kek.jp/conferenceDisplay.py?confId=15502>
- Now we are J-PARC P58.
- Draft minutes (not yet public, will be public soon)
 - “The committee recognizes the importance of the physics goals of the experiment and supports detector and beam R&D. The committee recommends that user support be given to scientists working on P58 R&D”
 - “For the next PAC meeting, the collaboration should report on comparisons between HyperK and LBNE and on their examination of other types of photon detectors. The PAC also encourages ... to consider further extensions of the physics program, ... (such as) the sensitivity to non-standard neutrino interactions ...”
- Next PAC: Dec. 3-5, 2014

“Necessity and scientific merit of the project should be fully explained”

- We are asked similar questions in world-wide coordination meetings such as APpEC meeting, FNAL summit, ICFA ν panel...
- Special session on “Messages to the FNAL summit” to discuss
 - Physics potential of Hyper-K in the study of accelerator ν , atmospheric ν , proton decays, Supernova ν , solar ν etc
 - Physics importance, HK’s uniqueness and complementary
 - possible world-wide cooperation beyond projects

Express your opinions & Share information

Message to the FNAL summit from Hyper-K - Irving K Barber Learning Centre Room 182 **(10:50-12:30)**

- **Conveners: Prof. SHIOZAWA, Masato (The University of Tokyo, Institute for Cosmic Ray Research, ICRR)**

time	title	presenter
10:50	Physics potential of Hyper-K and complementarity (accelerator nu) (00h10')	YOKOYAMA, Masashi (University of Tokyo)
11:00	Opportunities for a WC detector at the second Oscillation maximum at LBNF/Homestake (00h15')	KONAKA, Akira (TRIUMF)
11:15	Physics Potential of Hyper-K and complementarity (atmospheric nu and Proton decays) (00h10')	WENDELL, Roger (ICRR)
11:25	Physics Potential of Hyper-K and complementarity (astrophysics) (00h10')	WALTER, Chris (Duke University) O'SULLIVAN, Erin (Duke University)
11:35	Discussions and Summary (00h55')	NAKAYA, Tsuyoshi (Kyoto)
	- Hyper-K physics potentials and complementarity (00h10')	
	- Water detector in LBNF (00h10')	
	- collaborative work on accelerator/beamline upgrade (00h10')	
	- collaborative work on Argon detector? (00h10')	
	- collaborative work on water detector development (liner, water system, photo-sensors, DAQ, other materials) (00h10')	
	- more? (00h05')	

More goals of this meeting

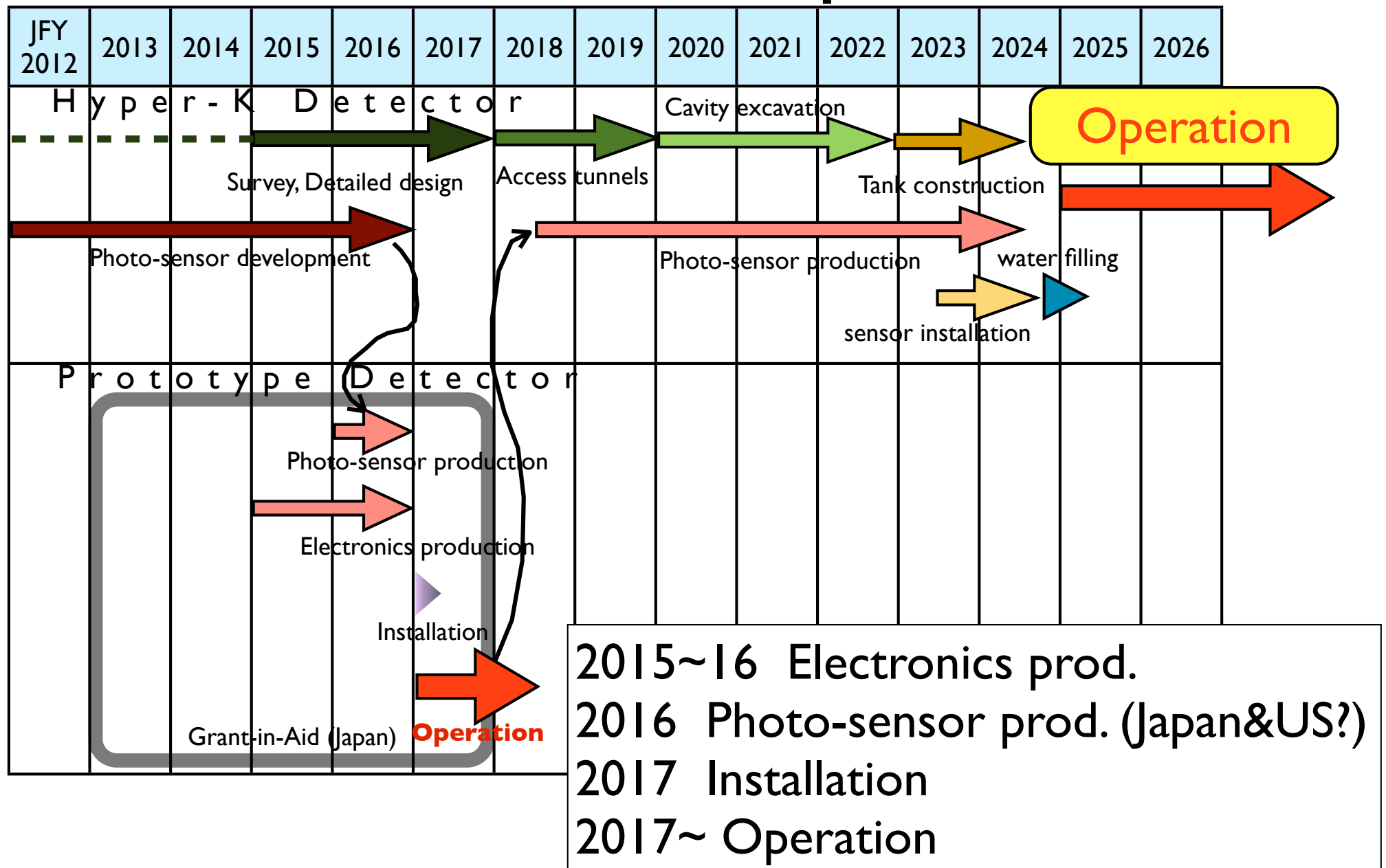
- Discussions toward **site selection** (Mozumi or Tochibora) in terms of detector construction and physics sensitivity
- (Initial) result on **detector optimization** (segmentation wall, photo-sensors) by using HK software
- Prepare for **photo-sensor selection** (Super-K type, new BL-type PMT, Hybrid-type, else?)
- Design and development on **other detector components**
- More study on **physics capabilities**
- **Near detector** requirement and conceptual design

Optimized design for starting budget request

Prototype detector

- Grant-in-Aid (\$2.3M in 5year) R&D money for 5 years from 2013. ~1.2M\$ for the prototype detector.
- Goals
 - Final test of O(100) HK-ID (and HK-OD) photo-sensors
 - give green signal to the mass production
 - DAQ electronics (under water?)
 - Test of other detector components and calibration system
- Started forming groups (US, UK, Canada, Spain, and Japan)
- making concrete plan and schedule
 - test of liner?
 - when we select photo-sensor type?
 - design of electronics should be defined
- budget requests in each countries are going on

Timeline Proposal



Let's enjoy the meeting
&
Let's make fruitful
discussions towards our
dream