

NNN08, Paris, France, September, 2008

Memories of Yoji Totsuka



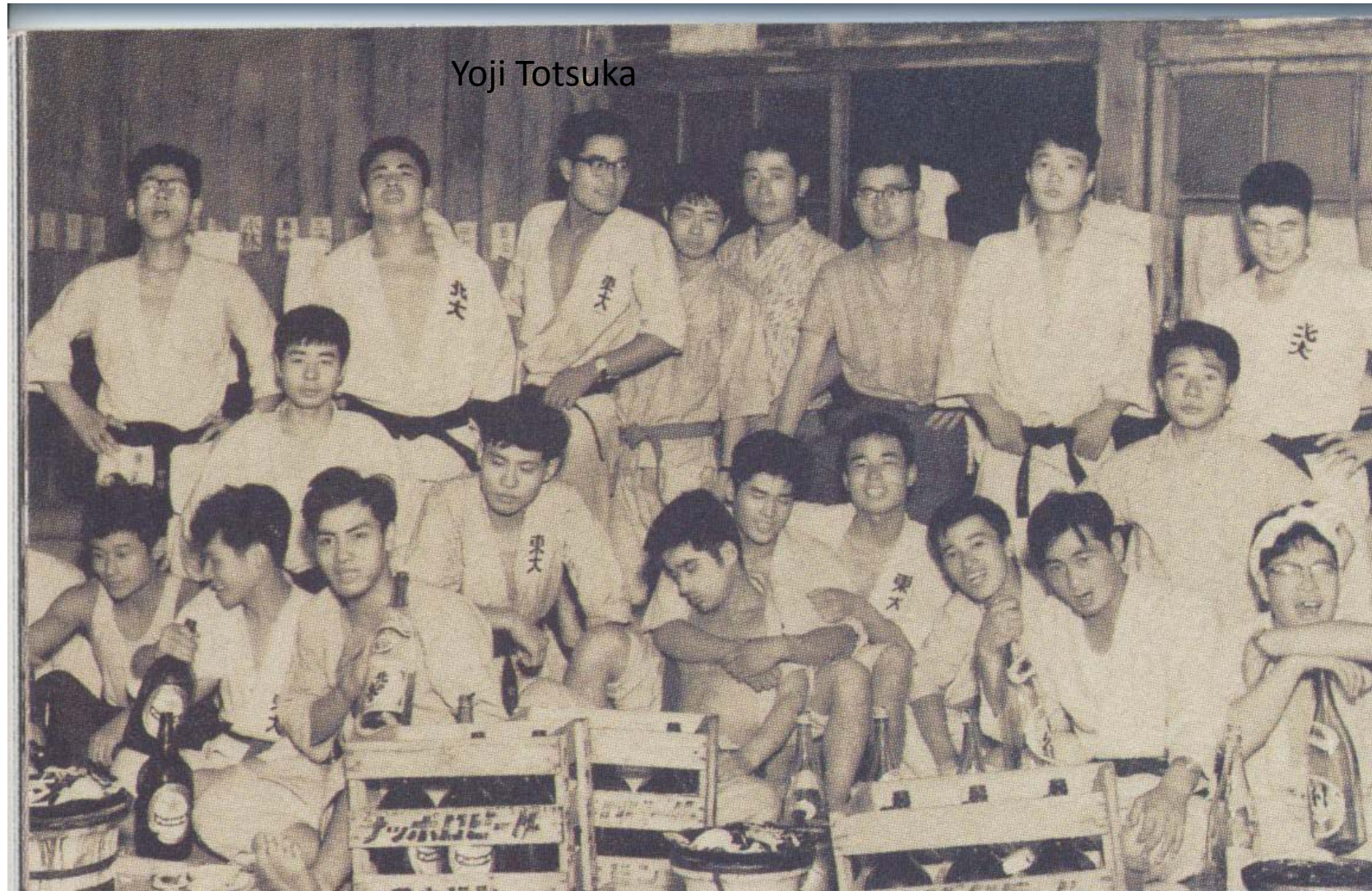
(Photo by
C.Walter at
Nu2000)

Curriculum Vitae: Yoji Totsuka

- Born: March 6, 1942
- PhD (physics): U. of Tokyo (1972)
- Positions:
 - Research associate, Univ. of Tokyo (1972-1979)
 - Associate professor, Univ. of Tokyo (1979-1987)
 - Professor, faculty of Science, U. of Tokyo (1987-1988)
 - Professor, ICRR, U. Tokyo (1988-2002)
 - Director, Kamioka Observatory, ICRR, U. of Tokyo (1995-2002)
 - Director, ICRR, U. of Tokyo (1997-2001)
 - Professor, KEK (2002-2003)
 - Director General, KEK (2003-2006)
 - Director, Research Center for Science Systems, JSPS (2006-2008)
- Died: July 10, 2008

(As a Japanese, I sometimes call “Totsuka-san” in this talk.)

Yoji Totsuka as a student in U. of Tokyo



Totsuka-san spent a lot of his time on “Karate”.

Photo from Nikkei-Science.

Yoji Totsuka's scientific activities

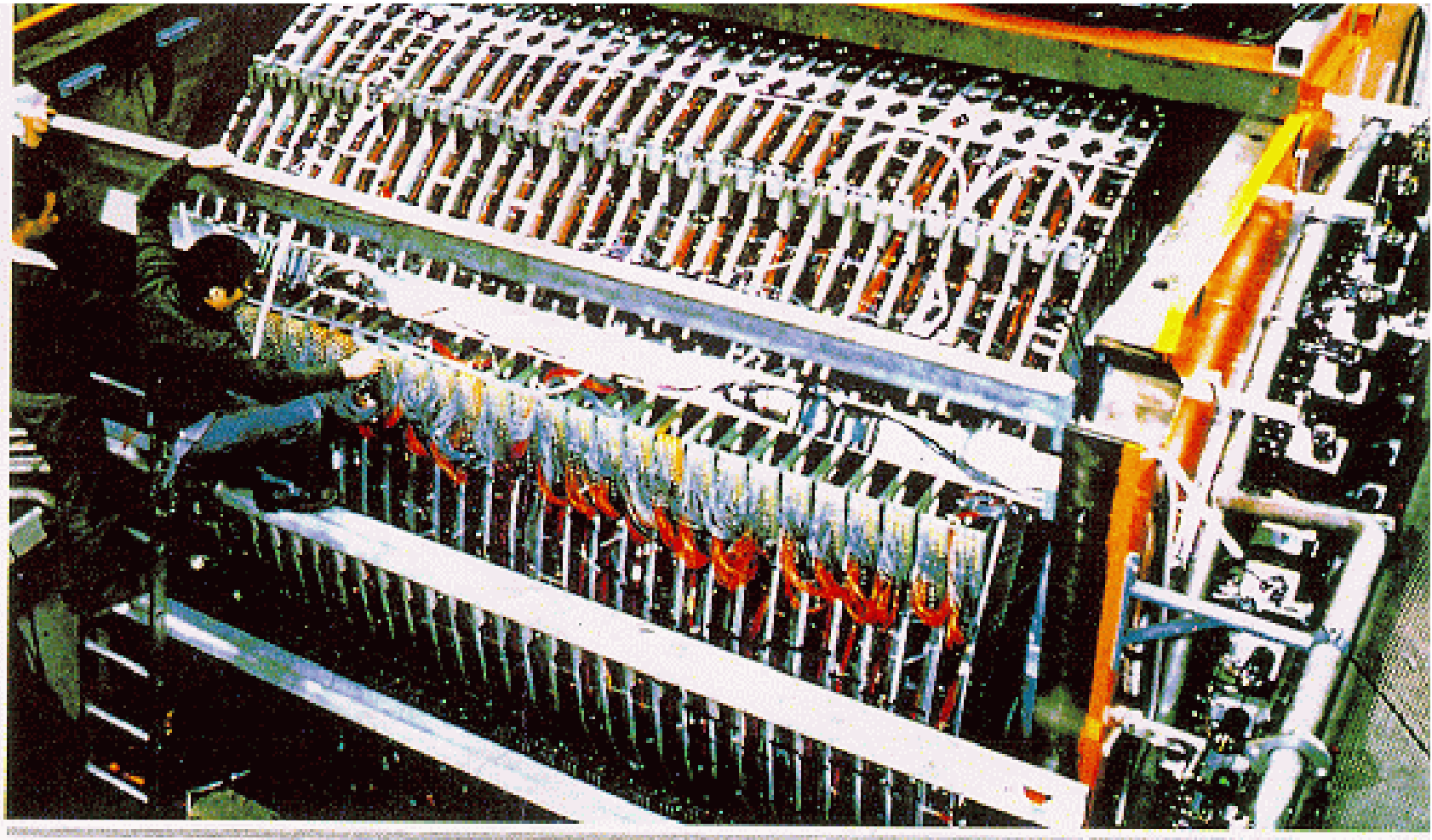
PhD work: Measurement of underground muon bundles



Totsuka-san and Suda-san in from of their underground muon detector in Kamioka. Photo from Nikkei-Science.

Yoji Totsuka's scientific activities

In Germany: DASP and JADE e^+e^- experiments (1972 – 1981)



Totsuka-san with other members of the Tokyo group was in charge of the barrel lead-glass calorimeter in JADE.

Photo from ICEPP homepage

Yoji Totsuka's scientific activities

Kamiokande (1983–1996)



Y. Totsuka

M. Koshiba

Spring 1983

Yoji Totsuka's scientific activities

Golden era of Kamiokande (1), (1987)

VOLUME 58, NUMBER 14

PHYSICAL REVIEW LETTERS

6 APRIL 1987

Observation of a Neutrino Burst from the Supernova SN1987A

K. Hirata,^(a) T. Kajita,^(a) M. Koshiba,^(a,b) M. Nakahata,^(b) Y. Oyama,^(b)
N. Sato,^(c) A. Suzuki,^(b) M. Takita,^(b) and Y. Totsuka^(a,c)

University of Tokyo, Tokyo 113, Japan

T. Kifune and T. Suda

Institute for Cosmic Ray Research, University of Tokyo, Tokyo 118, Japan

K. Takahashi and T. Tanimori

National Laboratory for High Energy Physics (KEK), Ibaraki 305, Japan

K. Miyano and M. Yamada

Department of Physics, University of Niigata, Niigata 950-21, Japan

E. W. Beier, L. R. Feldscher, S. B. Kim, A. K. Mann, F. M. Newcomer, R. Van Berg, and W. Zhang
Department of Physics, University of Pennsylvania, Philadelphia, Pennsylvania 19104

and

B. G. Cortez^(d)

California Institute of Technology, Pasadena, California 91125

(Received 10 March 1987)



Yoji Totsuka's scientific activities

Golden era of Kamiokande (2) (1988)

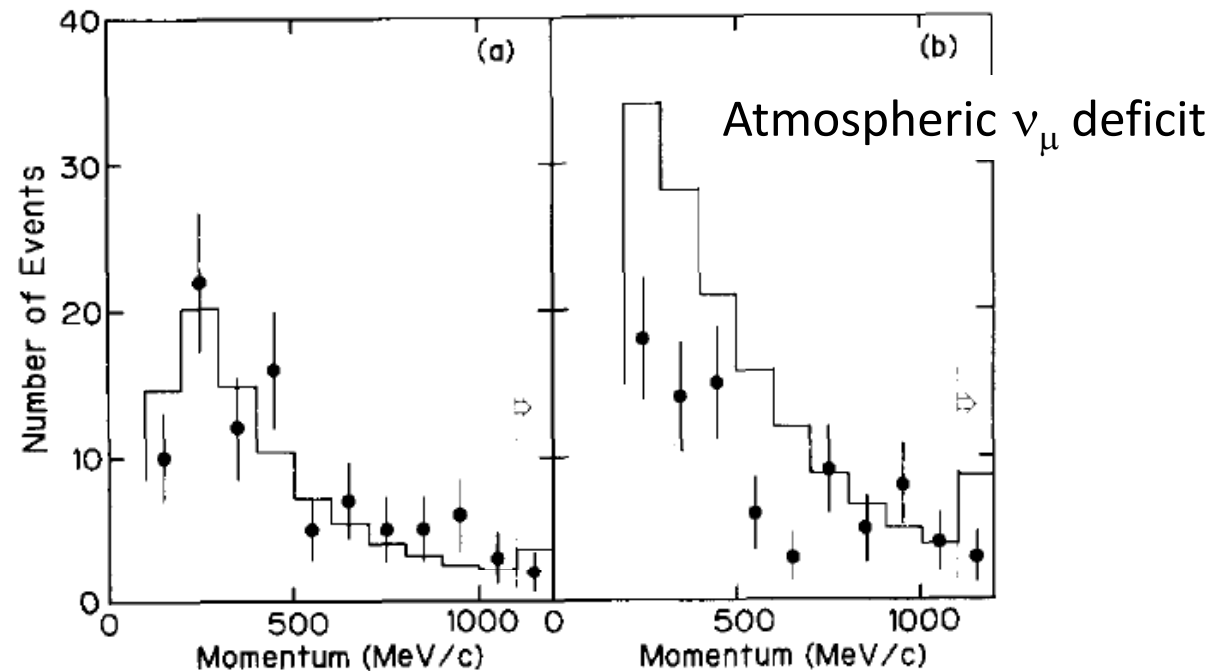
Soon after SN1987A, Prof. Koshiba retired from Univ. of Tokyo.
Then, Totsuka-san became the spokesperson of Kamiokande.

Volume 205, number 2,3

PHYSICS LETTERS B

28 April 1988

EXPERIMENTAL STUDY OF THE ATMOSPHERIC NEUTRINO FLUX



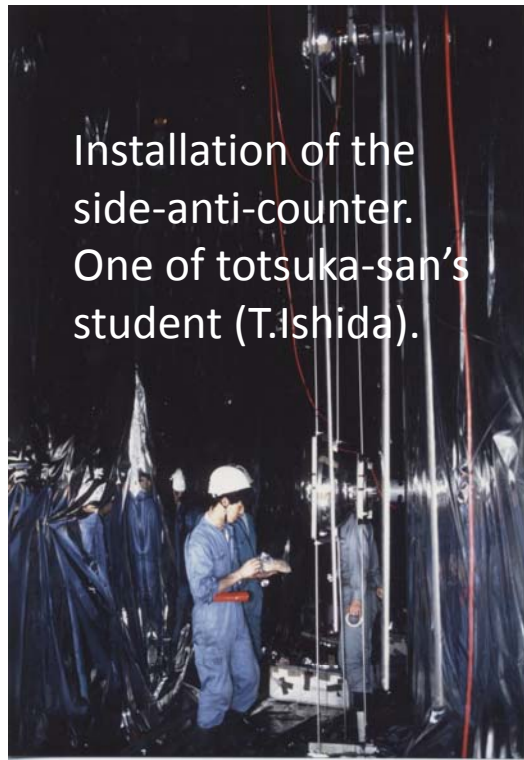
Yoji Totsuka's scientific activities

Golden era of Kamiokande (3) (1989)

VOLUME 63, NUMBER 1

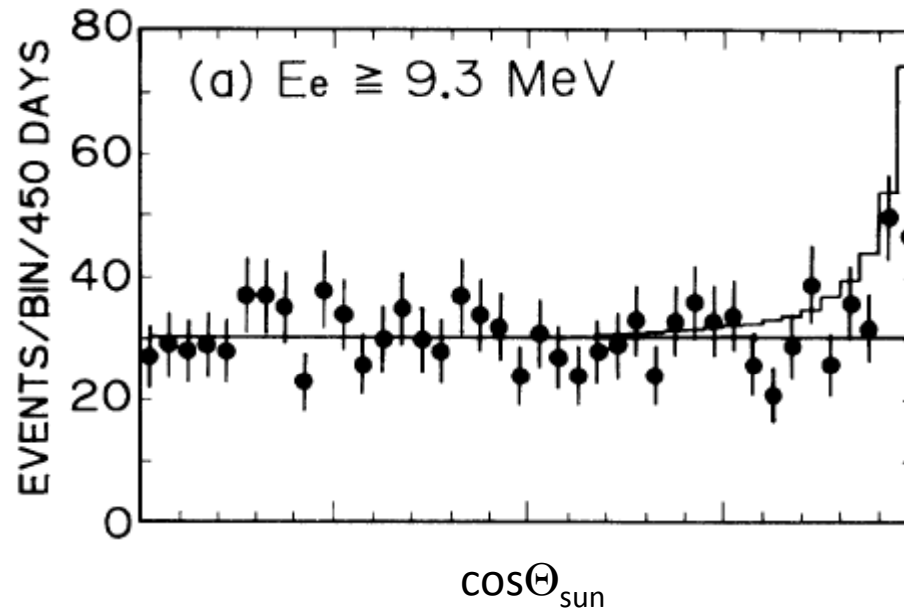
PHYSICAL REVIEW LETTERS

3 JULY 1989



Installation of the side-anti-counter. One of Totsuka-san's student (T. Ishida).

Observation of ^8B Solar Neutrinos in the Kamiokande-II Detector



Confirmation of solar neutrino deficit.

Kamiokande, lead by Prof. Koshiba and Totsuka-san, published several key results that lead to the future revolution in neutrino physics.

Yoji Totsuka's scientific activities

Super-Kamiokande (1996–)



Totsuka-san was always with us!

Top construction at the bottom
(Spring 1995).

Starting the experiment on April 1, 1996 at 0:00



Yoji Totsuka's scientific activities

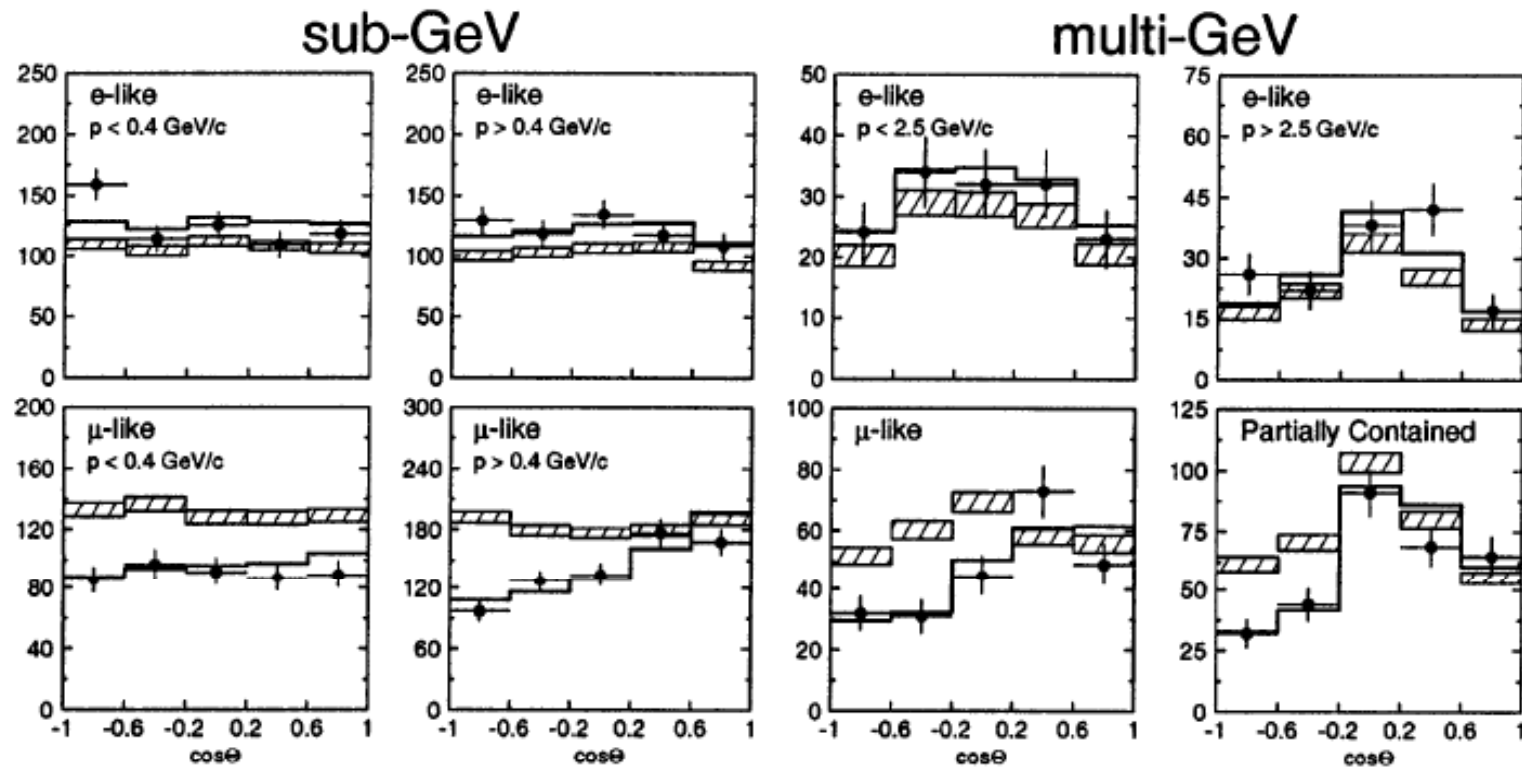
VOLUME 81, NUMBER 8

PHYSICAL REVIEW LETTERS

24 AUGUST 1998

Evidence for Oscillation of Atmospheric Neutrinos

(Super-Kamiokande Collaboration)



Discovery news to the world

June 5, 1998

REMARKS BY THE PRESIDENT AT MASSACHUSETTS INSTITUTE OF TECHNOLOGY 1998 COMMENCEMENT

THE WHITE HOUSE

Office of the Press Secretary
(Lincoln, Massachusetts)

For Immediate Release
1998

June 5,

First, we must help you to ensure that America continues to lead the revolution in science and technology. Growth is a prerequisite for opportunity, and scientific research is a basic prerequisite for growth. Just yesterday in Japan, physicists announced a discovery that tiny neutrinos have mass. Now, that may not mean much to most Americans, but it may change our most fundamental theories -- from the nature of the smallest subatomic particles to how the universe itself works, and indeed how it expands.

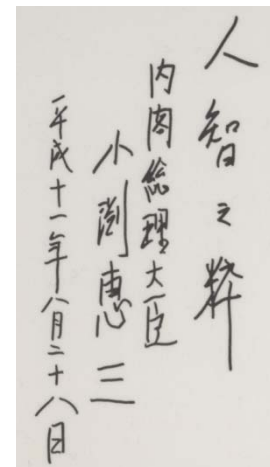
This discovery was made, in Japan, yes, but it had the support of the investment of the U.S. Department of Energy. This discovery calls into question the decision made in

.....



Prime minister
K. Obushi

Y.Totsuka



Aug. 28, 1999

One of the happiest moment for the Super-K collab.!



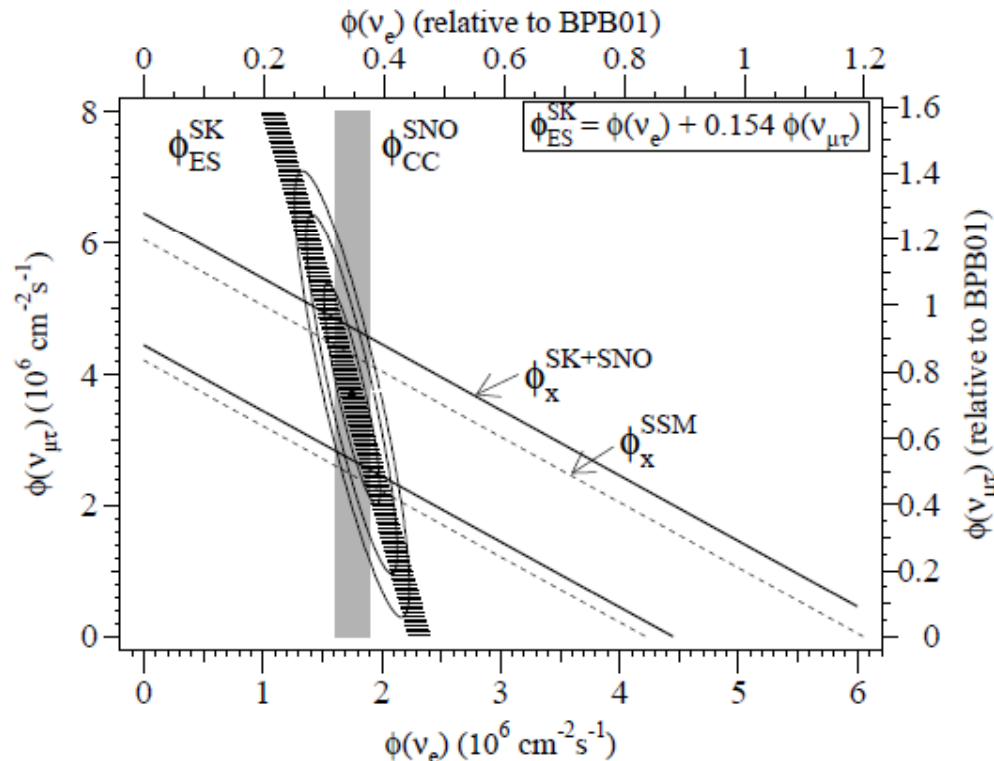
Soon after the announcement of the Asahi-prize in Dec 1998.

Yoji Totsuka's scientific activities

Solving solar neutrino problem with SNO by neutrino oscillations (2001)

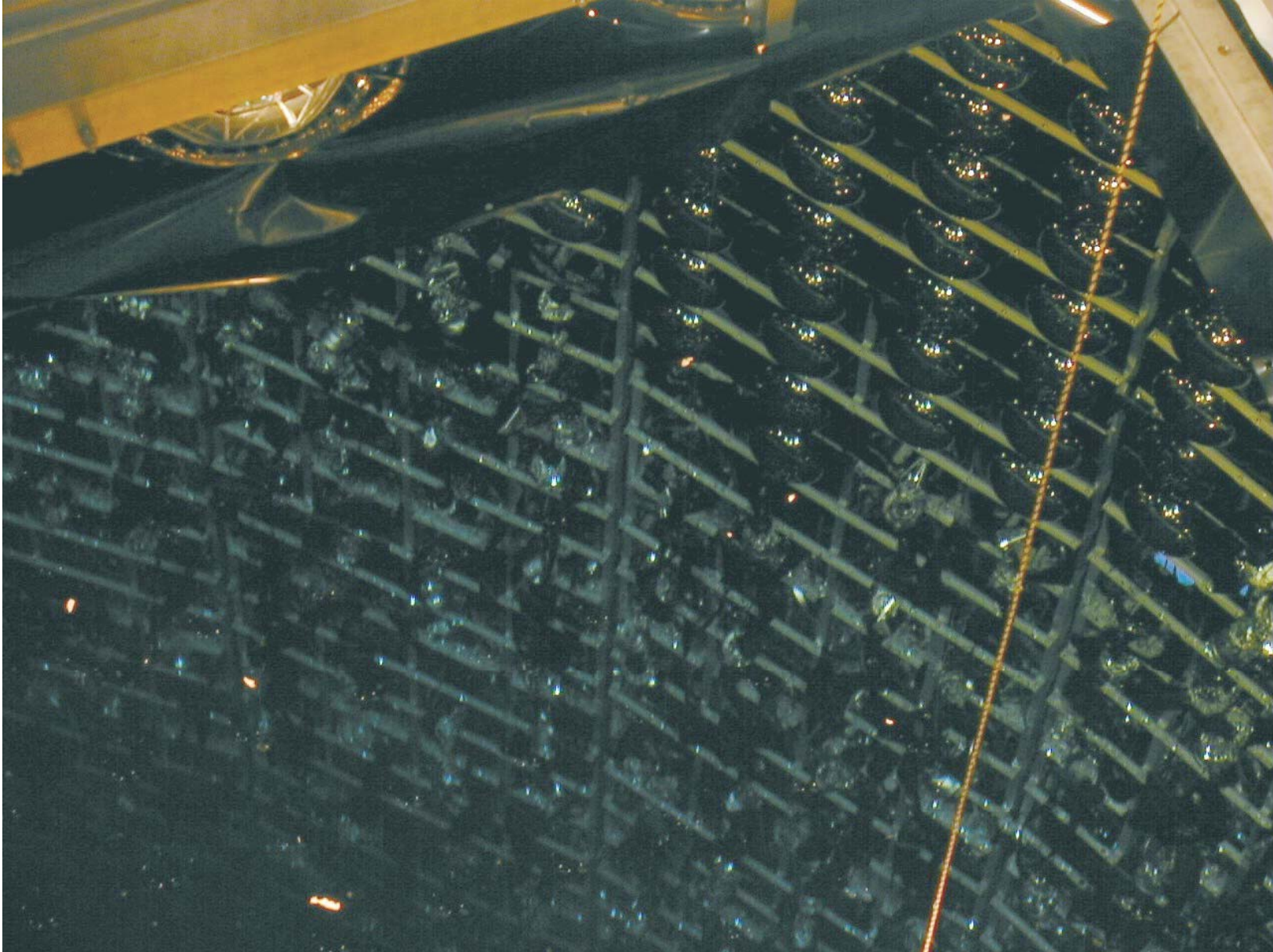
$$\phi_{\text{SK}}^{\text{ES}}(\nu_x) = 2.32 \pm 0.03 \text{ (stat.)}_{-0.07}^{+0.08} \text{ (sys.)} \times 10^6 \text{ cm}^{-2}\text{s}^{-1}. \quad \text{Super-K, elastic scattering}$$

$$\phi_{\text{SNO}}^{\text{CC}}(\nu_e) = 1.75 \pm 0.07 \text{ (stat.)}_{-0.11}^{+0.12} \text{ (sys.)} \pm 0.05 \text{ (theor.)} \times 10^6 \text{ cm}^{-2}\text{s}^{-1} \quad \text{SNO Charged Current}$$



(Plot from the SNO paper in 2001.)

Nov. 2001



On the next day

Dear colleague,

As a director of the Kamioka Observatory, which owns and is responsible to operate and maintain the Super-Kamiokande detector, it is really sad that I have to announce the severe accident that occurred on November 12 and damaged the significant part of the detector. We would like to express our deep regret to Japanese, US and Korean people who have generously supported the Super-Kamiokande experiment. The cause and how to deal with the loss in future will be discussed by newly founded committees. However, even before discussing with my colleagues of the Super-K and K2K collaborations, I have decided to express my intention on behalf of the staff of the Kamioka Observatory.

We will rebuild the detector. There is no question. The strategy may be the following two steps, which will be proposed and discussed among my colleagues.

1. Quick restart of the K2K experiment.

(1) We will clear the safety measures which may be suggested by the committees, (2) reduce the number density of the photomultiplier tubes by about a half, (3) use the existing resources, (4) resume the K2K experiment as soon as possible; the goal may be within one year.

2. Preparation for the JHF-Kamioka experiment.

(1) Restore the full Super-Kamiokande detector armed with the state-of-the-art techniques. (2) The detector will be ready by the time of the commissioning of the JHF machine.

Needless to say, we will be able to study atmospheric neutrinos and search for proton decay with the step-1 detector. We will be able to maintain our watch for supernova with a somewhat higher-energy threshold.

To achieve our objective is formidable but we are determined to do so. We certainly need your encouragement, advice and help. I should appreciate it very much if you could support our effort as you have kindly done so before.

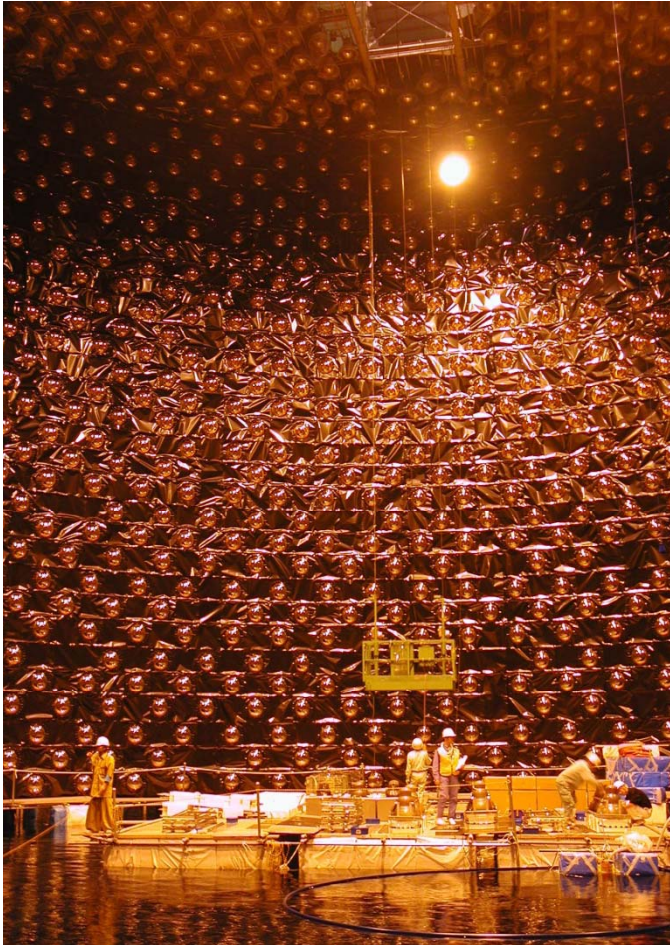
Best regards,

Yoji Totsuka

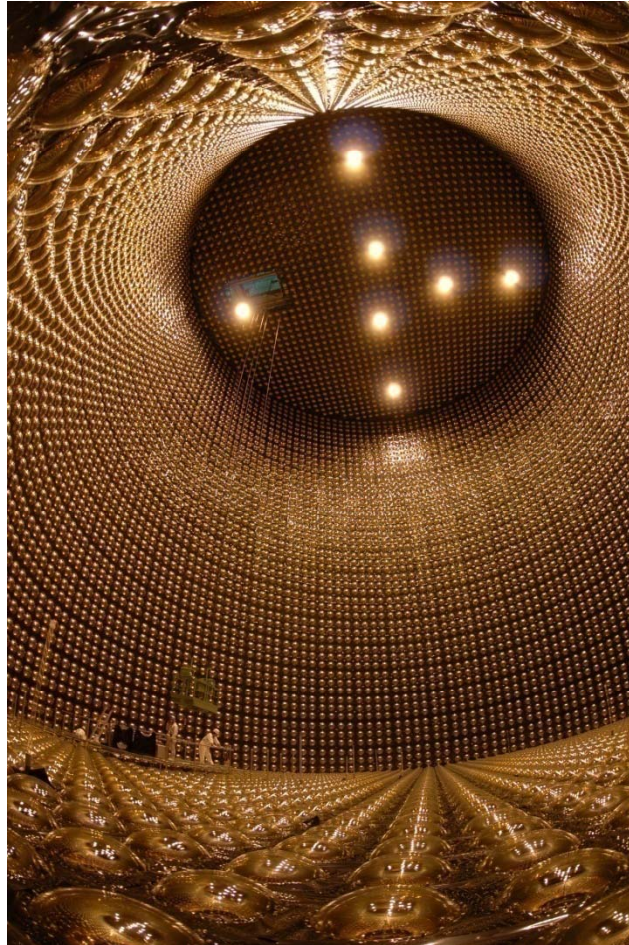
director, Kamioka Observatory

On behalf of the Kamioka Observatory staff

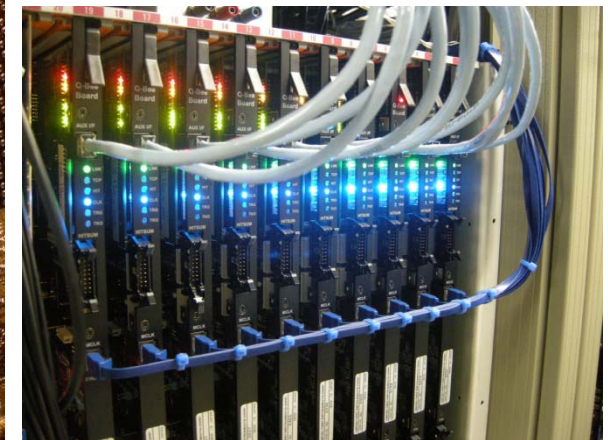
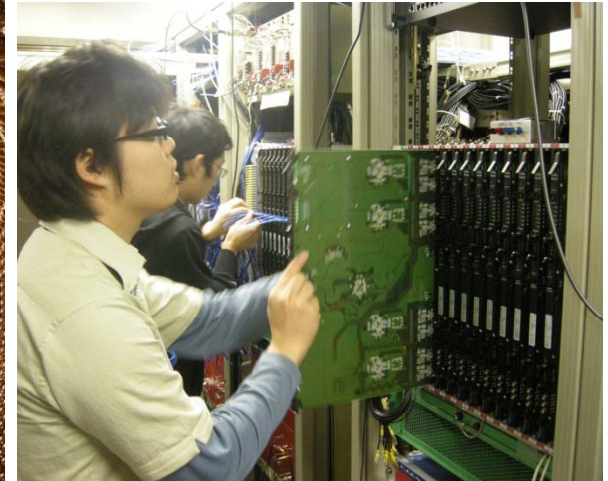
Super-K after the accident



Reconstructing the Super-K detector with a half PMT density in 2002 (Super-K-II).



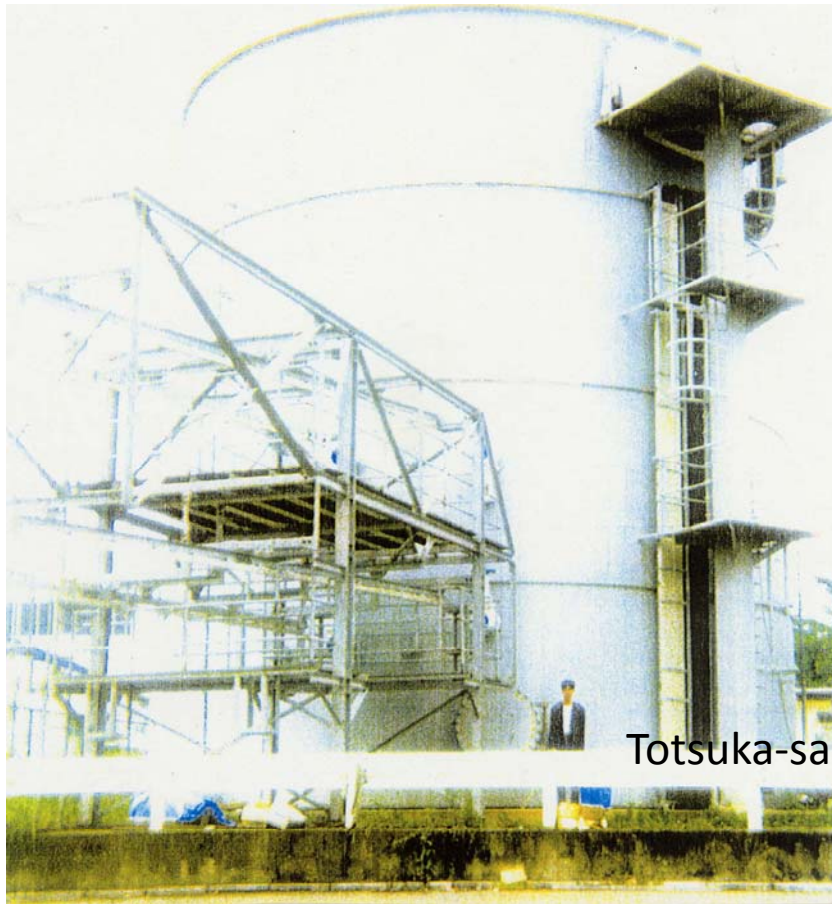
Full recovery (2006, Super-K-III).



Installing new electronics (Sep. 2008, Super-K-IV).

Yoji Totsuka's scientific activities

Soon after the “Atmospheric neutrino anomaly”, Totsuka-san proposed (and carried out) a beam test experiment to confirm the μ -vs. e separation in water Cherenkov detectors. (1991-1994)



Totsuka-san's student: T. Hayakawa



Yoji Totsuka's scientific activities

Totsuka-san was very strategic: Beam test to long baseline experiment.



1kton tank: From the beam test to K2K.

K2K experiment

Confirmation of neutrino oscillations by accelerator
neutrino beam



Y. Totsuka

Yoji Totsuka's scientific activities

Totsuka-san was very strategic: K2K to T2K.



Y. Totsuka

As the DG of KEK, Totsuka-san supported J-PARC and T2K very strongly.

Yoji Totsuka: Honors and Prizes

(Probably an incomplete list)

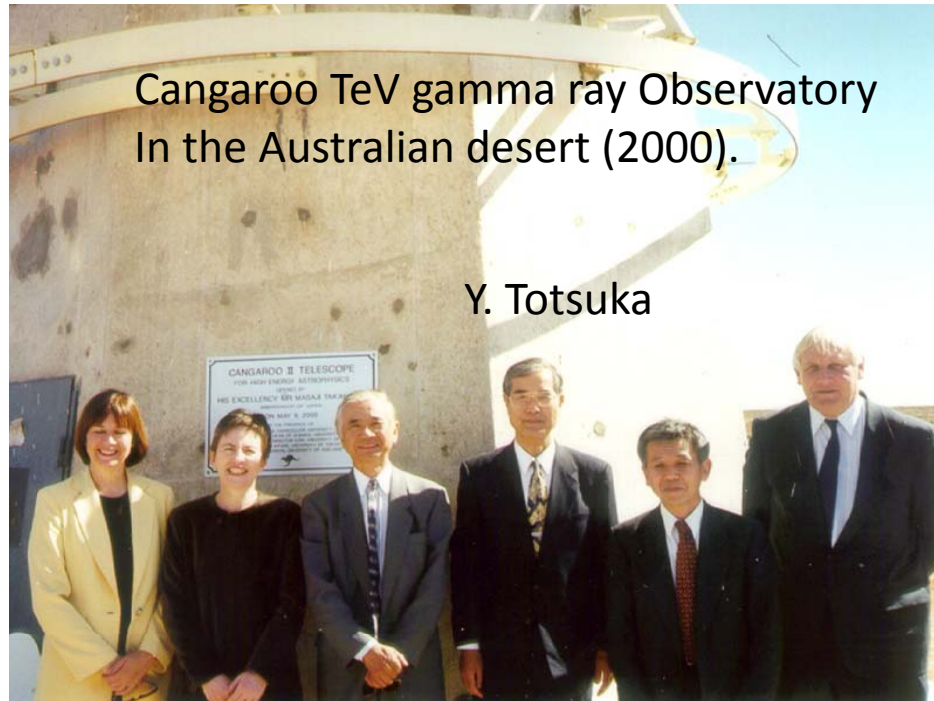
- Nishina prize (1987)
- Asahi prize (1988)
- Rossi prize (1989)
- Inoue prize (1990)
- EPS prize (1995)
- Asahi prize (1999)
- 紫綬褒章Sijyu-hosyo (2001)
- Panofsky prize (2002)
- Fujiwara prize (2002)
- 文化功労者Bunka-korosha (2002)
- Pontecorvo prize (2003)
- 文化勲章Cultural Medal (2004)
- Franklin medal (2007)



Prime Minister
J. Koizumi

Yoji Totsuka

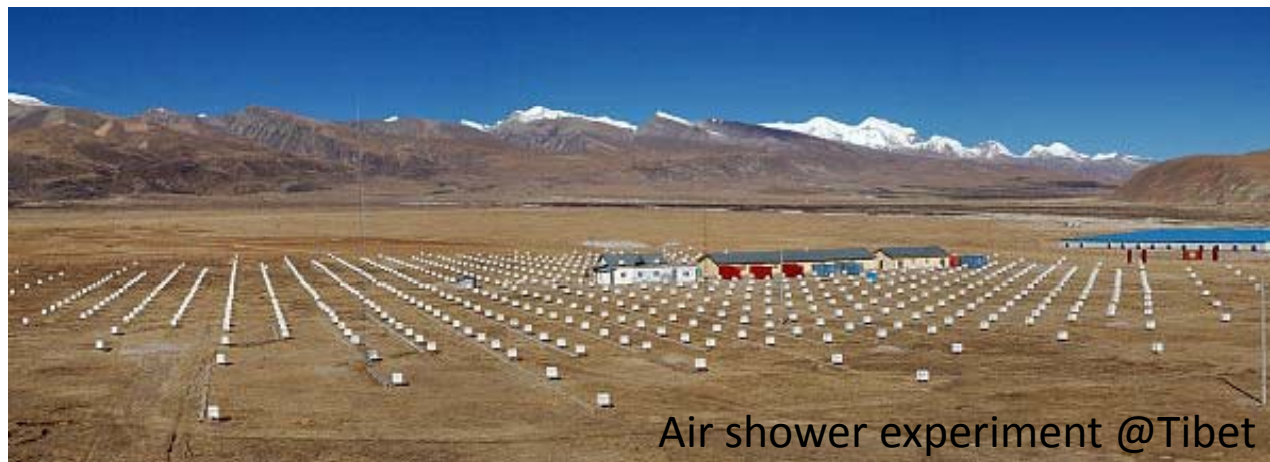
Yoji Totsuka: a great supporter of cosmic ray researches



Cangaroo TeV gamma ray Observatory
In the Australian desert (2000).

Y. Totsuka

Telescope Array Highest Energy Cosmic Ray Experiment @Utah, USA



Air shower experiment @Tibet

ICRR owes much on Totsuka-san's very strong support on Cosmic Ray Science.

Totsuka-san's last presentation slides.

Slides prepared for the NP08 workshop at Mito,
Japan on March 5, 2008



Neutrinos and Elementary Particles

Y. Totsuka

Research Center for Science Systems, Japan
Society for the Promotion of Science, JSPS
080305 Mito

■ Introduction for non-experts:

- Weak Interaction
- Neutrinos
 - Oscillation
 - Matter Effect
- What is known (very brief)

■ A View of the J-PARC and its HEP Division from an Outsider



My Favorite Themes

- Determine δ
 - The Universe is dominated by matter and has no anti-matter.

- Discover proton decay
 - Origin of extremely small mass of the neutrinos.
 - The Universe was born and will die.
 - The Universe is dominated by matter and has no anti-matter.

- What is the dark-matter?
 - Unknown new heavy particles.

- What is the dark energy?
 - New paradigm beyond relativity and quantum theory?

We fully agree with Totsuka-san!

Yoji Totsuka 1942-2008



We have lost a great leader in neutrino physics,
astroparticle physics and elementary particle physics.
And we have lost a wonderful personal friend.

Totsuka-san is always like this photo in our memory.