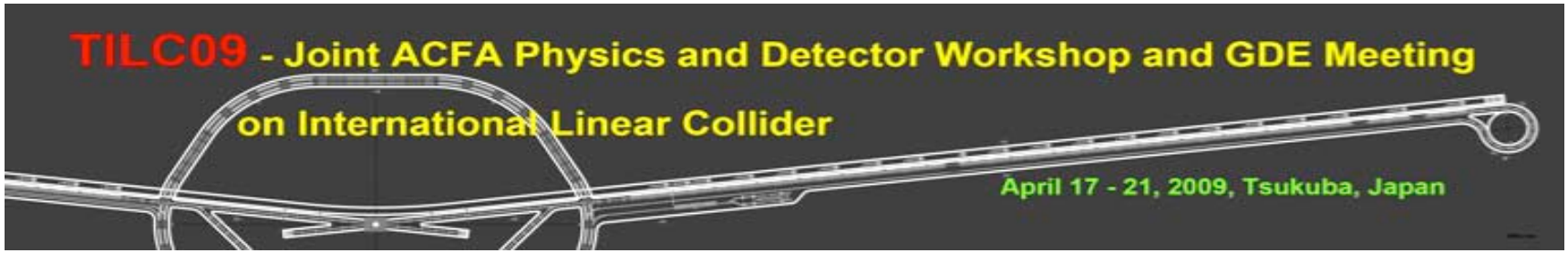
Scientific Carrier of Yoji Totsuka and His Legacy on ILC

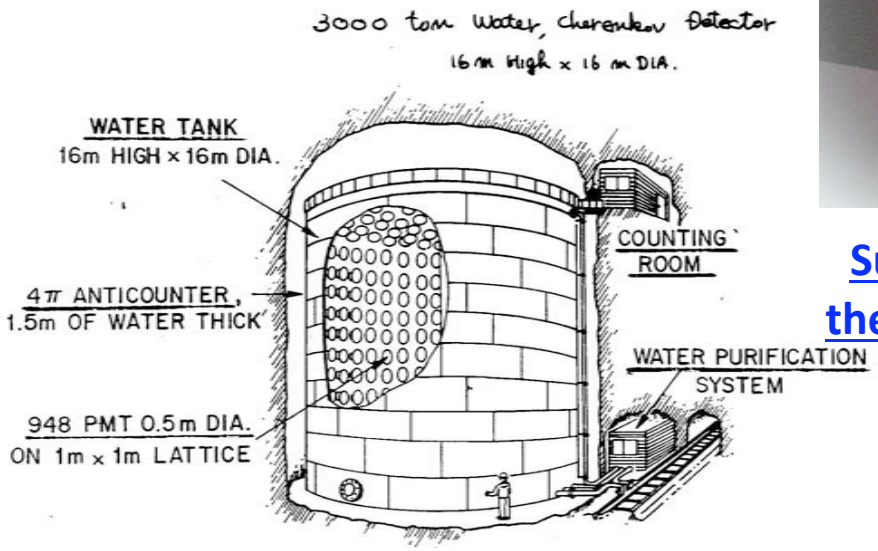
died of cancer
at the age of 66
on 10 July, 2008

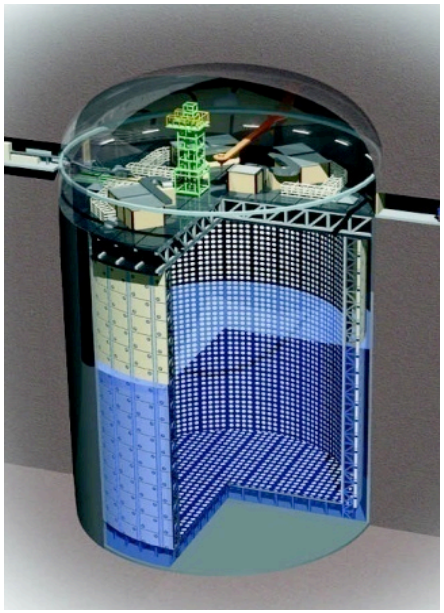


Yoji Totsuka,

an outstanding contributor to great advances in neutrino physics ,
and Japanese particle physics leader.

Kamiokande :
the Second Spokesperson

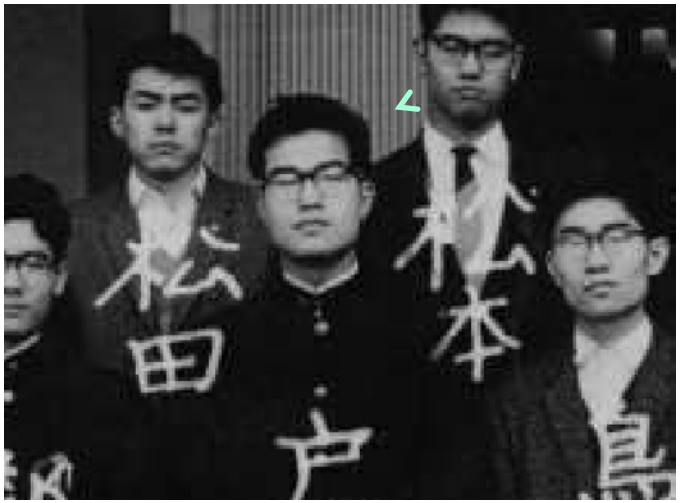




Super-Kamiokande :
the First Spokesperson

KEK :
Director General

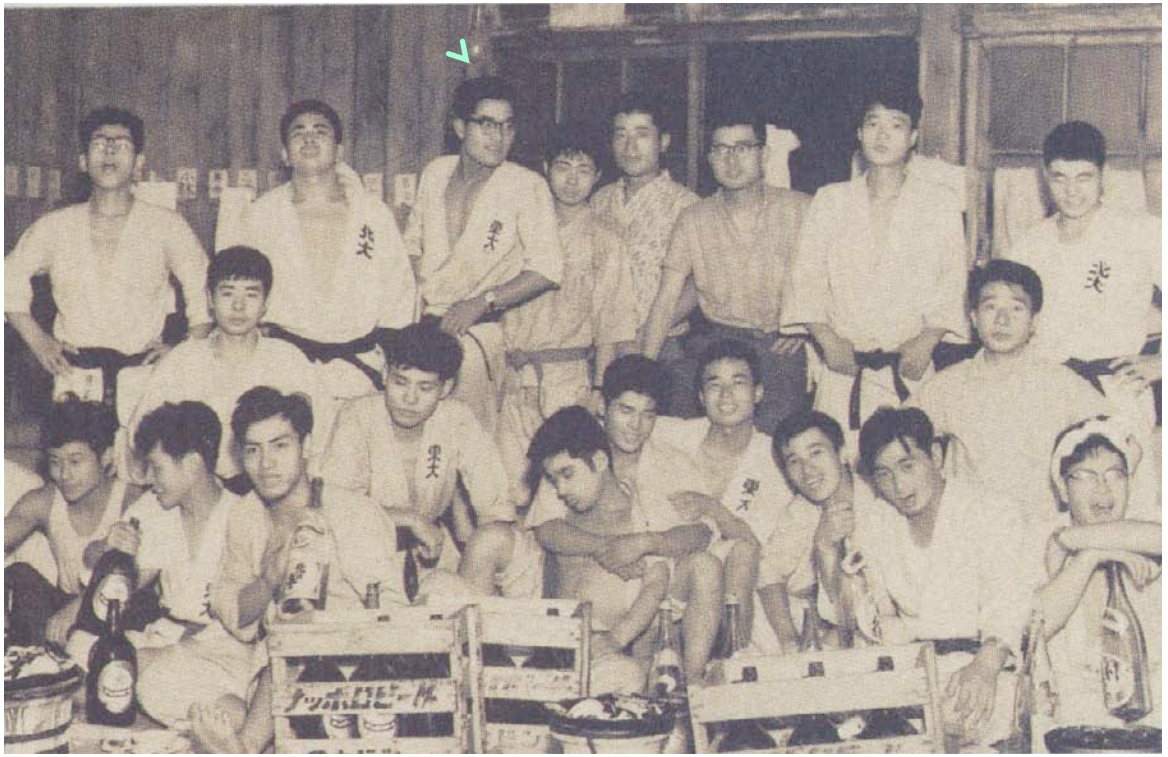
Undergraduate



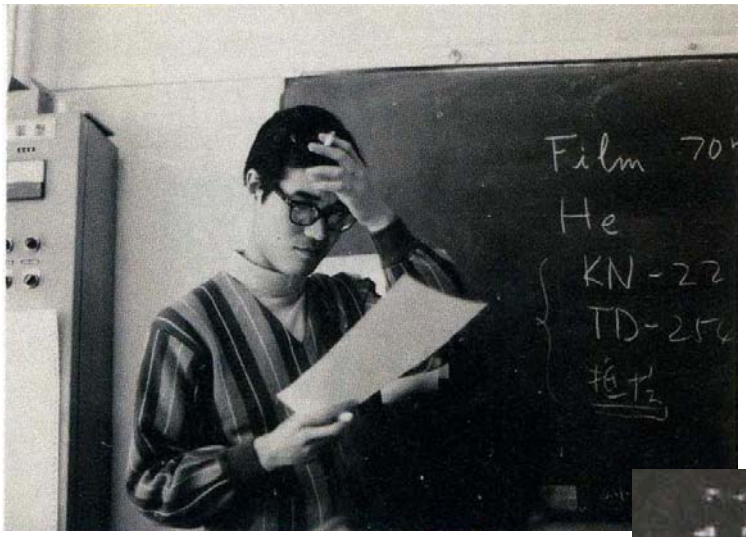
Physics Department
Univ. of Tokyo

Totsuka-san :

- spent a lot of his time on “Karate”
- was a bodyguard of “Dance Club”
- repeated one year due to “all night long Mahjong”

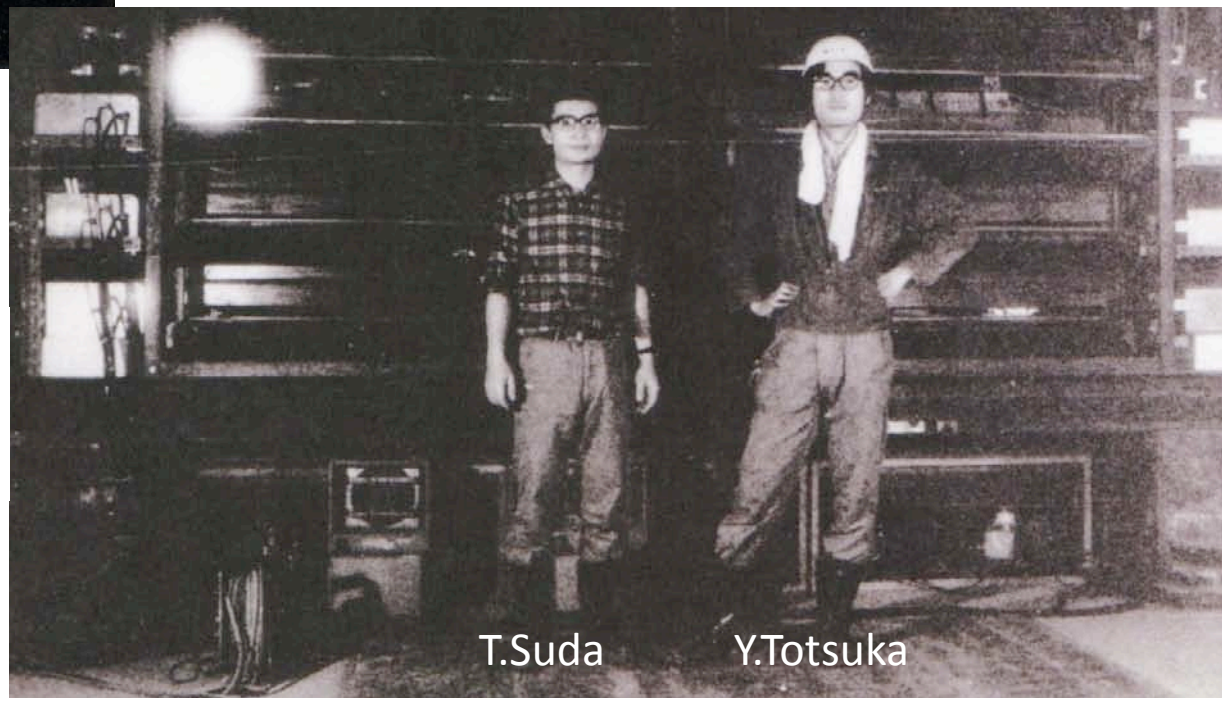


Graduate Studies



Totsuka-san :

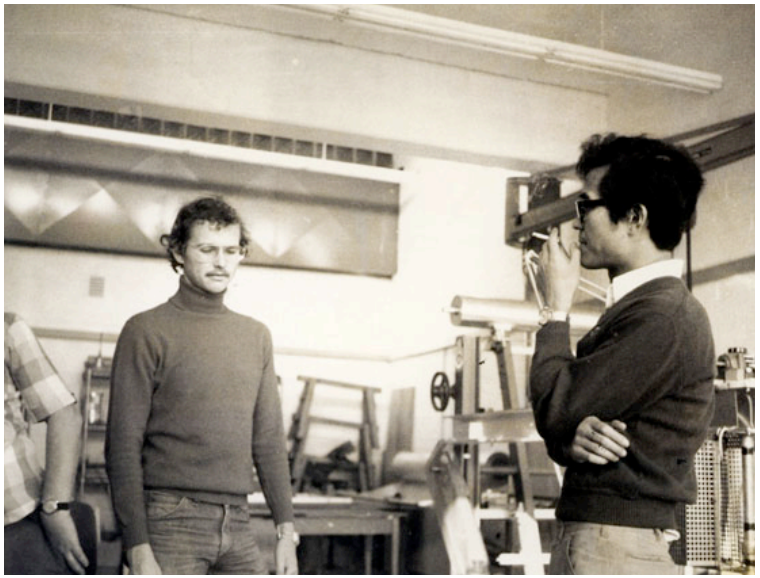
- **one of the first-generation students under Prof. Koshiba**
- **PhD thesis (1972)**
  "Measurement of underground muon bundles"



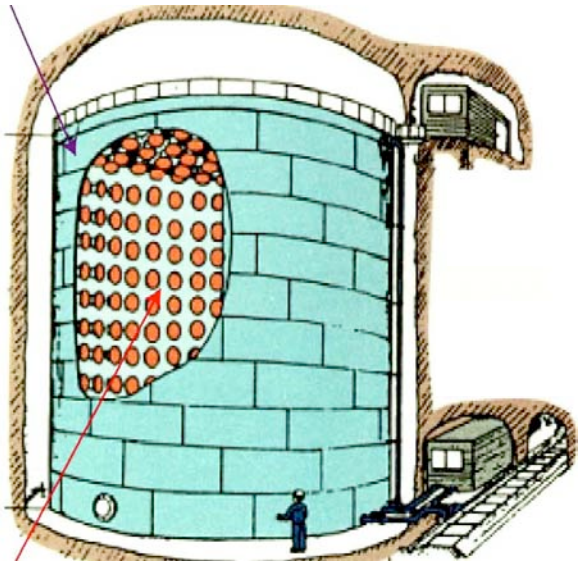
In front of their underground muon detector in Kamioka mine

DESY (1972 – 1980)

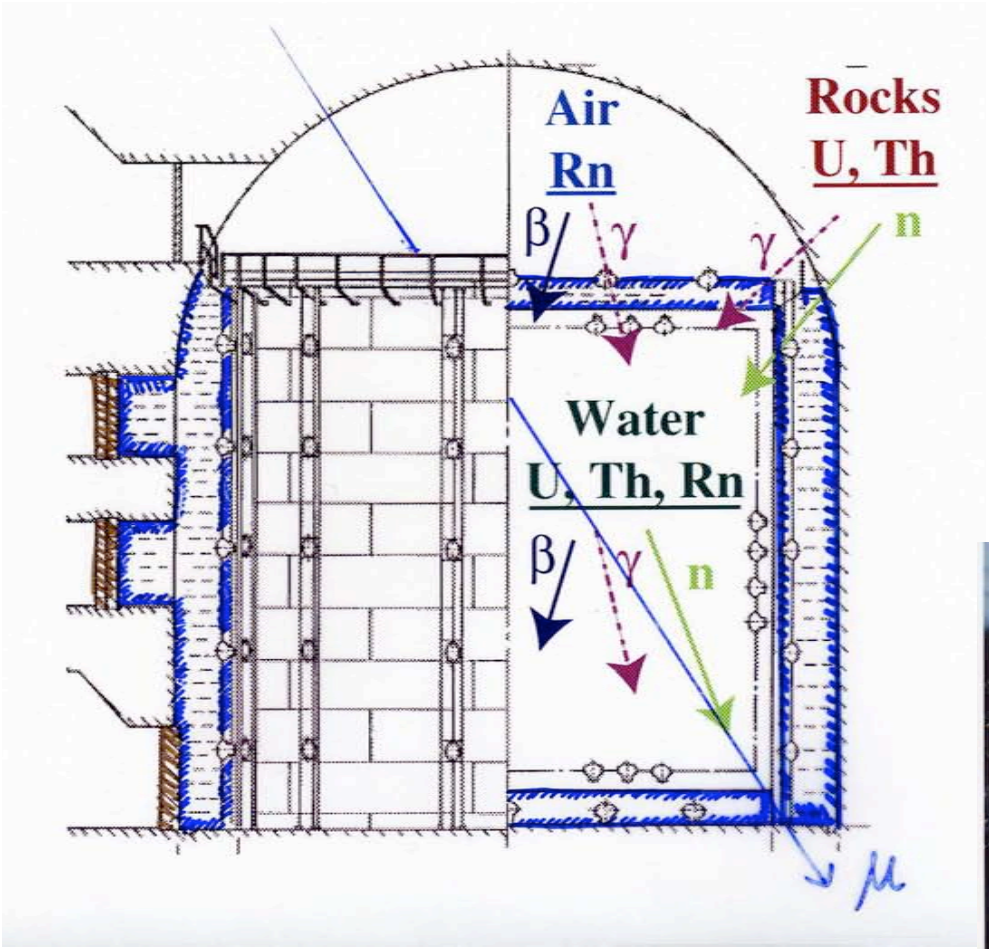
e^+e^- collider experiments of DASP and JADE in DESY

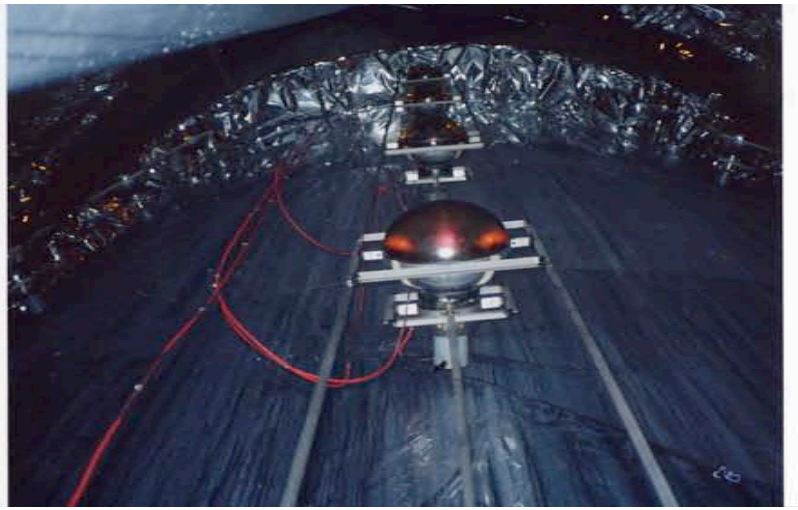


Back to Kamioka (1981 ~)



Kamiokande-II (1984 ~)

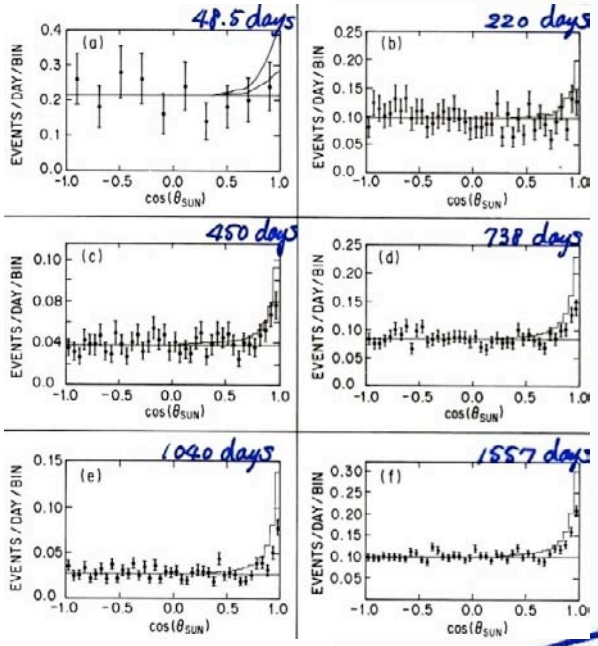




Kamiokande II

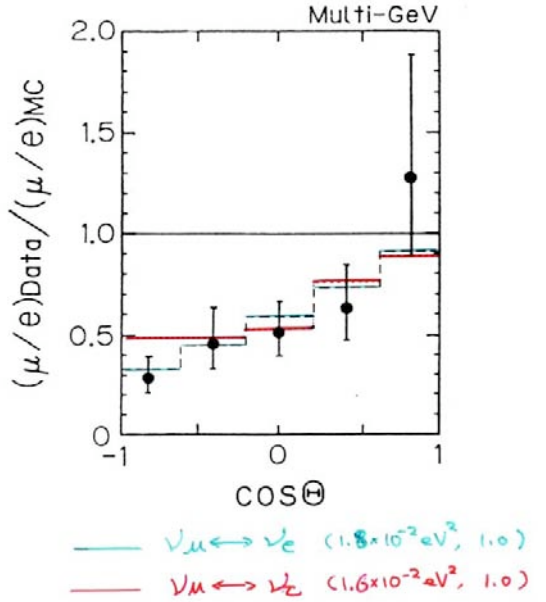
Solar Neutrino Deficit

Atmospheric Neutrino Anomaly



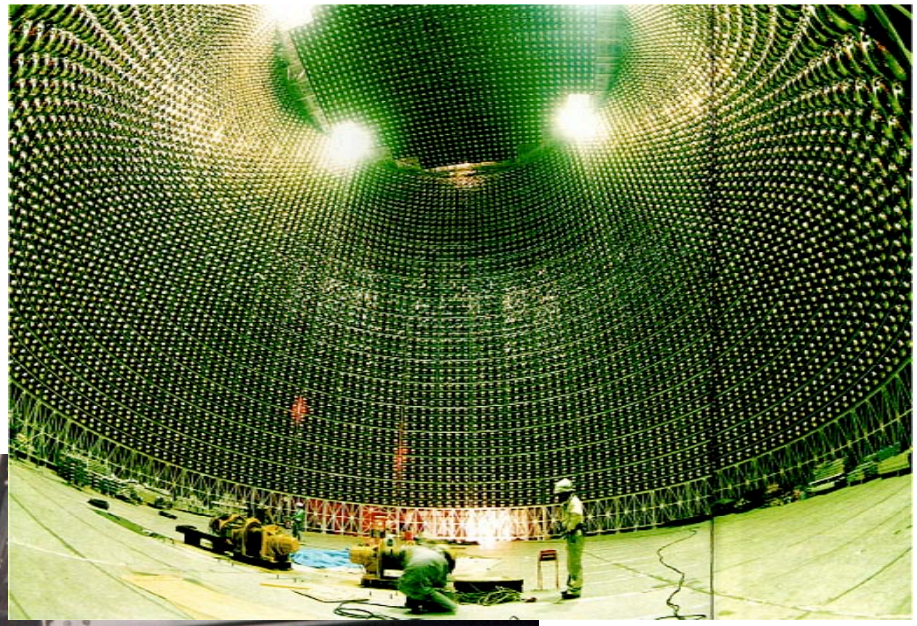
Neutrino Mass

More Light



Gigantic Water Cherenkov Detector
Super-Kamiokande

Super-Kamiokande (1996 ~)

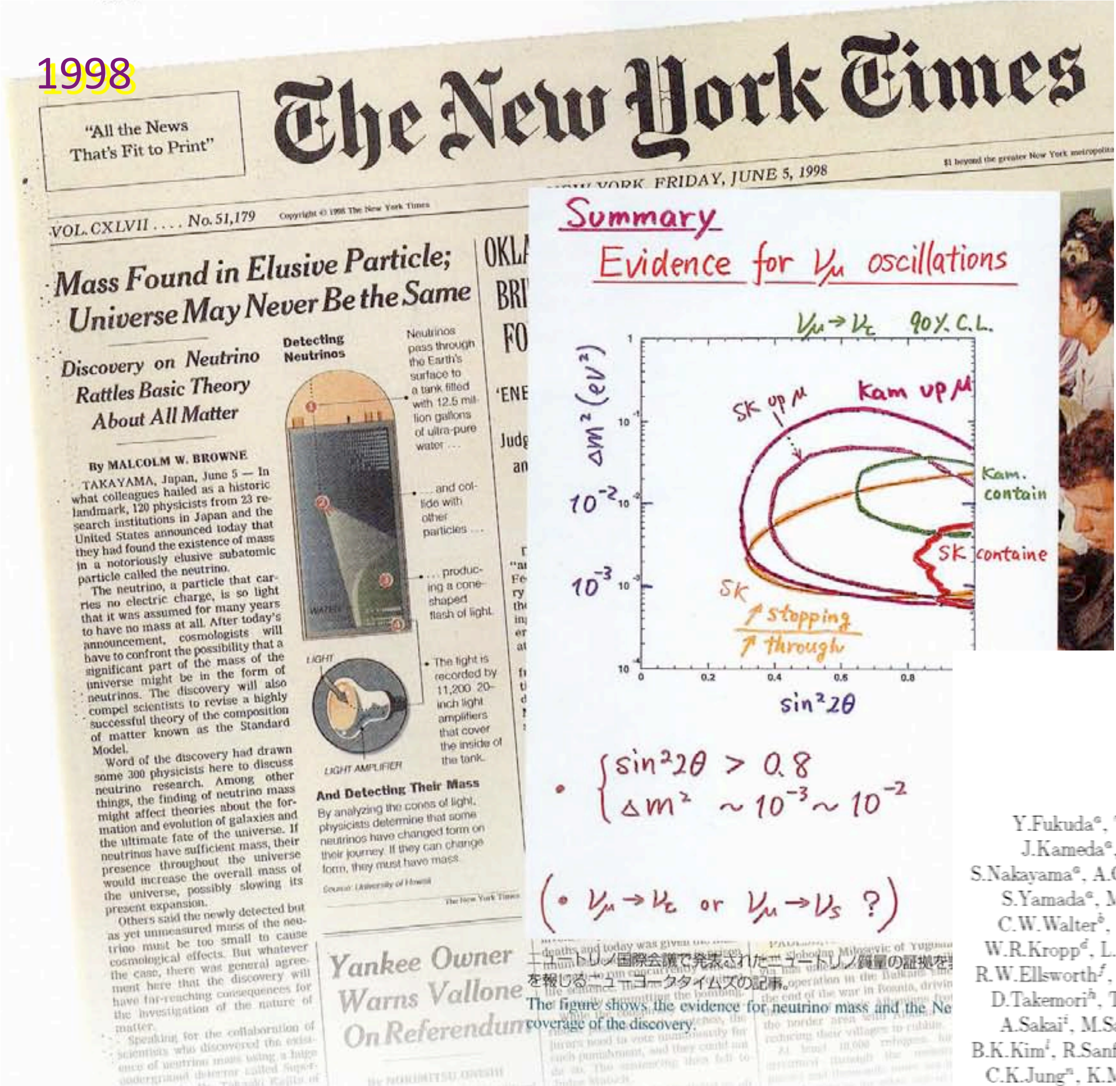


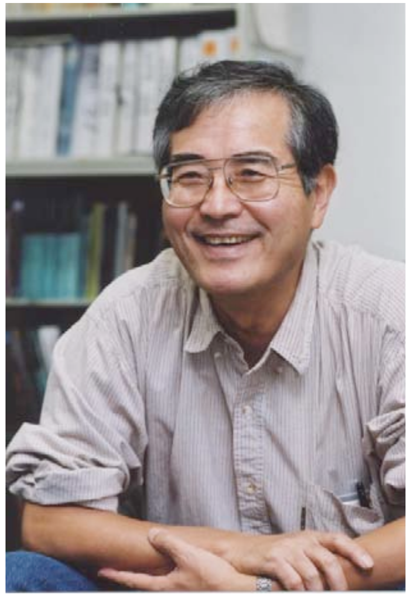
Totsuka-san :

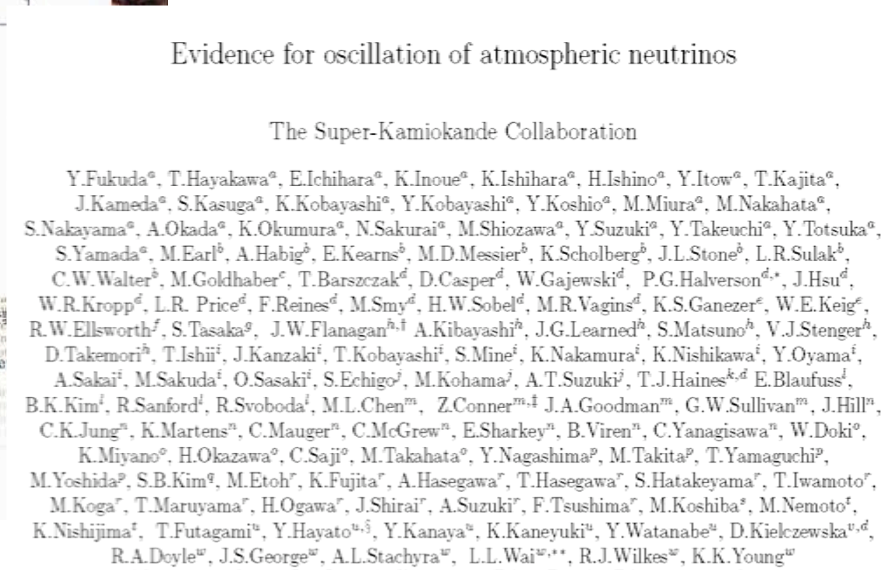
had declared the SK data-taking day from April 1st, 1996

Y. Totsuka

Discovery of Atmospheric Neutrino Oscillations : 1998







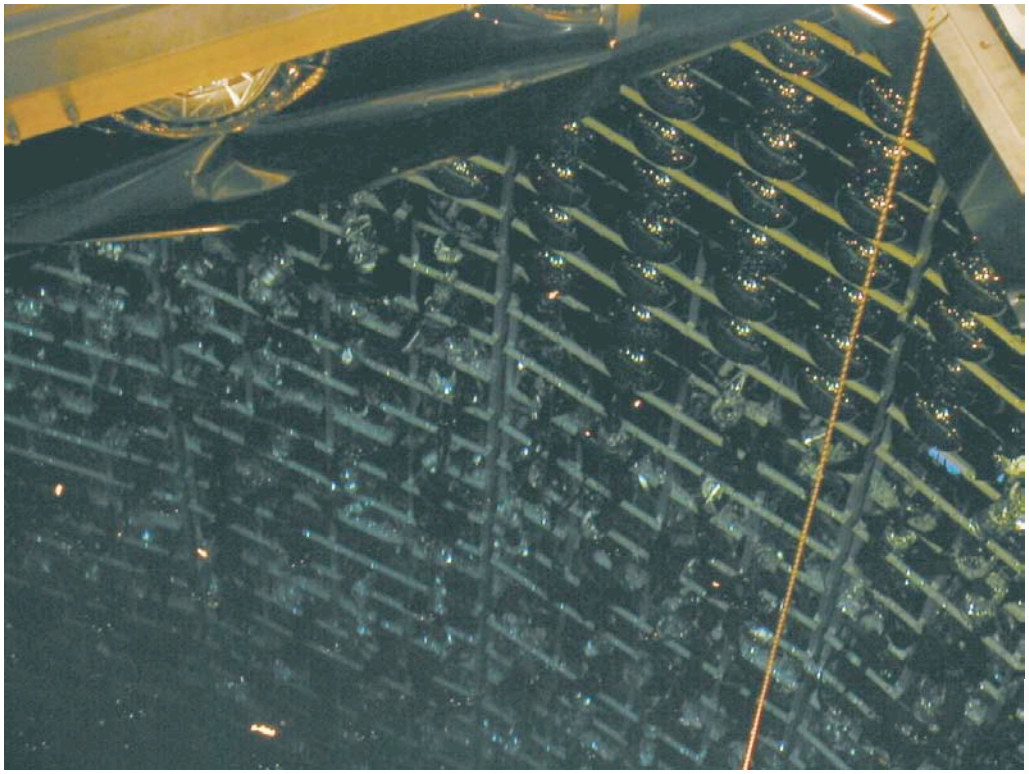
Evidence for oscillation of atmospheric neutrinos

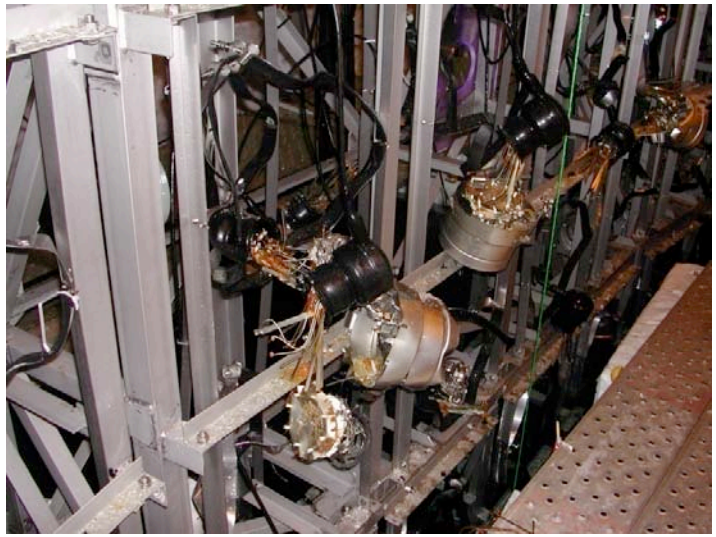
The Super-Kamiokande Collaboration

Y.Fukuda[a], T.Hayakawa[a], E.Ichihara[a], K.Inoue[a], K.Ishihara[a], H.Ishino[a], Y.Itow[a], T.Kajita[a], J.Kameda[a], S.Kasuga[a], K.Kobayashi[a], Y.Kobayashi[a], Y.Koshio[a], M.Miura[a], M.Nakahata[a], S.Nakayama[a], A.Okada[a], K.Okumura[a], N.Sakurai[a], M.Shiozawa[a], Y.Suzuki[a], Y.Takeuchi[a], Y.Totsuka[a], S.Yamada[a], M.Earl[b], A.Habig[b], E.Kearns[b], M.D.Messier[b], K.Scholberg[b], J.L.Stone[b], L.R.Sulak[b], C.W.Walter[b], M.Goldhaber[c], T.Barszczak[d], D.Casper[d], W.Gajewski[d], P.G.Halverson[d,*], J.Hsu[d], W.R.Kropp[d], L.R. Price[d], F.Reines[d], M.Smy[d], H.W.Sobel[d], M.R.Vagins[d], K.S.Ganezer[e], W.E.Keig[e], R.W.Ellsworth[f], S.Tasaka[g], J.W.Flanagan[h,†] A.Kibayashi[h], J.G.Learned[h], S.Matsuno[h], V.J.Stenger[h], D.Takemori[h], T.Ishii[i], J.Kanzaki[i], T.Kobayashi[i], S.Mine[i], K.Nakamura[i], K.Nishikawa[i], Y.Oyama[i], A.Sakai[i], M.Sakuda[i], O.Sasaki[i], S.Echigo[j], M.Kohama[j], A.T.Suzuki[j], T.J.Haines[k,d] E.Blaufuss[l], B.K.Kim[l], R.Sanford[l], R.Svoboda[l], M.L.Chen[m], Z.Conner[m,‡] J.A.Goodman[m], G.W.Sullivan[m], J.Hill[n], C.K.Jung[n], K.Martens[n], C.Mauger[n], C.McGrew[n], E.Sharkey[n], B.Viren[n], C.Yanagisawa[n], W.Doki[o], K.Miyano[o], H.Okazawa[o], C.Saji[o], M.Takahata[o], Y.Nagashima[p], M.Takita[p], T.Yamaguchi[p], M.Yoshida[p], S.B.Kim[q], M.Etoh[r], K.Fujita[r], A.Hasegawa[r], T.Hasegawa[r], S.Hatakeyama[r], T.Iwamoto[r], M.Koga[r], T.Maruyama[r], H.Ogawa[r], J.Shirai[r], A.Suzuki[r], F.Tsushima[r], M.Koshiba[s], M.Nemoto[t], K.Nishijima[t], T.Futagami[u], Y.Hayato[u,§], Y.Kanaya[u], K.Kaneyuki[u], Y.Watanabe[u], D.Kielczewska[v,d], R.A.Doyle[w], J.S.George[w], A.L.Stachyra[w], L.L.Wai[w,**], R.J.Wilkes[w], K.K.Young[w]

Neutrinos were getting closer and closer to us since this discovery

PMT Blasting on 12th November, 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 b

2. Prepara
(1) Restore dy by the time o

Needless t e will be able to

To achieve and help. I should appreciate it very much if you could support our effort as you have kindly done so before.

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.

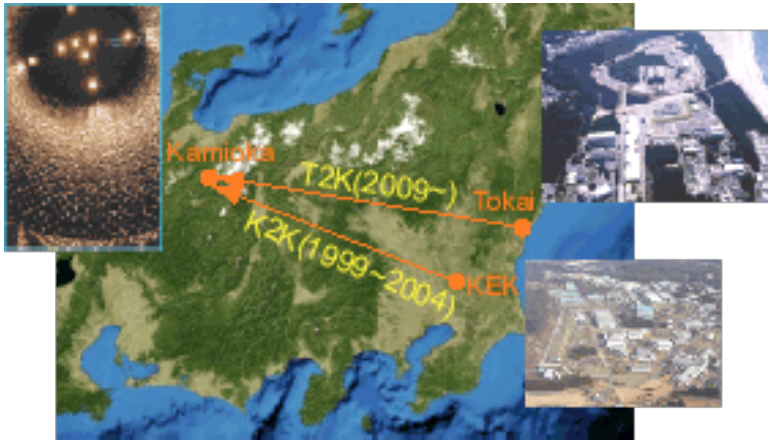
We will rebuild the detector. There is no question.

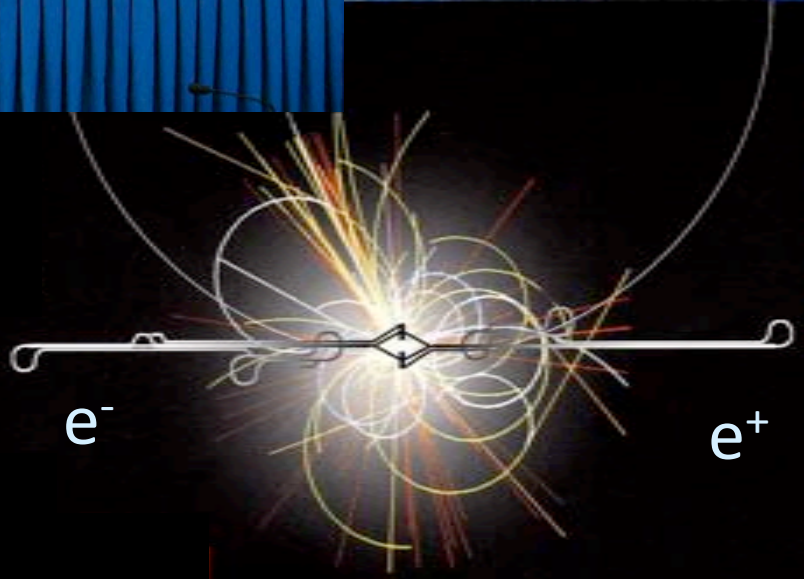
Best regards,
Yoji Totsuka
director, Kamioka Observatory
On behalf of the Kamioka Observatory staff

Director General of KEK (2003 ~ 2006)

J-PARC in Tokai

Encouraging K2K and T2K





Totsuka-san : Urged the ILC Project

international linear collider

Director's Corner

17 July 2008

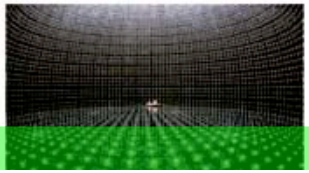
A personal tribute to Yoji Totsuka

Barry Barish

High-energy physics lost a giant in our field - and I lost a very good personal friend - when Yoji Totsuka, the former Director General of KEK, died of cancer at the age of 66 last week. I would like to pay special tribute to a great scientist and wonderful human being.

Yoji Totsuka.

Yoji Totsuka was renowned as a scientist for his ground-breaking work in neutrino physics, especially the discovery of atmospheric neutrino oscillations with the Super-Kamiokande detector. I was working on a related experiment at that time, the MACRO detector in the Grand Sasso Laboratory in Italy, where we observed possible hints of atmospheric neutrino oscillations. But it took the definitive and beautiful measurements of Yoji and his collaborators to make the discovery. Yoji went on to become Director General of KEK and won many prestigious awards for his science. This made him one of the most respected particle physicists in the world.



Yoji Totsuka's neutrino research was carried out on the Super-Kamiokande detector in Japan that followed up on the discoveries on the earlier Kamiokande detector. Super-K detected atmospheric muon and electron neutrinos that are created in the Earth's atmosphere due to high-energy cosmic rays interacting high in the atmosphere, producing secondary particles that yield muons and electrons. Simple kinematic arguments predict that the number of muon and electron neutrinos should be nearly equal. However, the measurements of Yoji an
as many muon neutrinos
produced. This effect alo
to neutrino oscillations. H
additional pieces of convi
and angular effects expe
providing additional stron

These results were first p
Neutrino Physics and Astr
immediately heralded by
all known alternative inte
his collaborators and as a
surprised any of us if he
projects that we now do

As Director General of KE
the Global Design Effort f
decision and took steps t
to cold technology. In a f
said *"KEK is also working*
technologies." (a stateme
encouraged me to accept
went out of his way to of
had stepped down as KEK DG. The last time I saw him was in Tokyo
less than a year ago, when he sought me out at my hotel to learn first

August 20, 2004

As Director General of KEK, Yoji Totsuka was a very big supporter of the Global Design Effort for the ILC. He immediately accepted the decision and took steps to convert the KEK R&D programme from warm to cold technology. In a featured NewsLine article a short time later, he said *"KEK is also working hard to establish and improve the SRF cavity technologies."* (a statement that has proven true!). Yoji personally

INTERNATIONAL ILC WORKSHOP

First ILC Workshop

Towards an International Design of a Linear Collider

November 13th (Sat) through 15th (Mon), 2004

KEK, High Energy Accelerator Research Organization
1-1 Oho, Tsukuba, Ibaraki 305-0801, Japan

Local Organizing Committee:
Yoji Totsuka (KEK)(Chair), Fumihiko Takasaki (KEK)(Deputy-chair), Junji Urakawa (KEK), Kiyoshi Kubo (KEK), Shigeru Kuroda (KEK), Nobuhiro Terunuma (KEK), Toshiyasu Higo (KEK), Tsunehiko Omori (KEK), Toshiaki Tauchi (KEK), Akiya Miyamoto (KEK), Masao Kuriki (KEK), Kiyosumi Tsuchiya (KEK), Shuichi Noguchi (KEK), Eiji Kako (KEK)

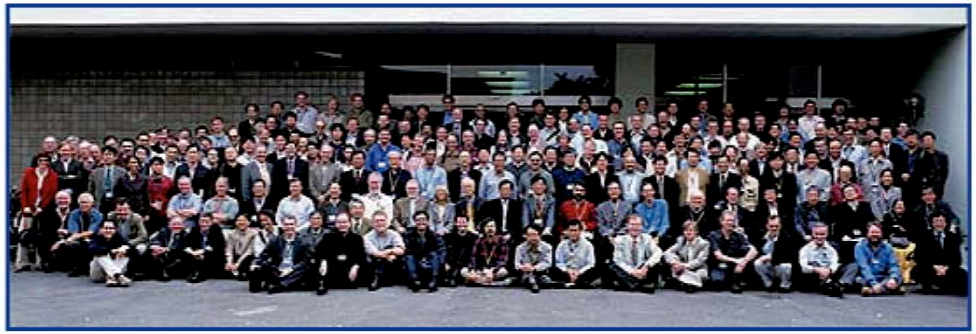
Brian Foster (Oxford), Maury Tigner (Cornell), Hesheng Chen (IHEP), Alexander Skrinsky (BINP), Carlos Garcia Canal (UNLP), Sachio Komamiya (Tokyo), Paul Grannis (SUNY)

http://lcdev.kek.jp/ILCWS/

KEK Hosted

First ILC Workshop

Towards an International Design of a Linear Collider, Nov.13-15, 2004, KEK



Participants at the First ILC Workshop (Nov.13, 2004)

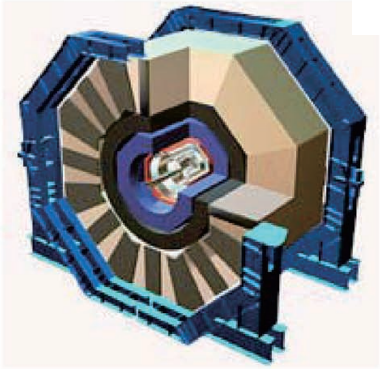
~ 220 participants from 3 regions, most of them accelerator experts

ILC NewsLine

Archive | Search ILC Newsline | ILC Home | Subscribe | Submit Suggestions

Feature Story

Detector Options for the ILC



If built, the International Linear Collider will hurl tiny electrons and positrons down 26 miles of accelerator, colliding the particles at the center in a microscopic explosion. But what good is it all if you can't see it happen?

in 2005, private committee

Prof. Yoji Totsuka,
Director General of KEK

When you need to make a dec n, it is useful to have advice from influential people whom you st. A

When you need to make a decision, it is useful to have advice from influential people whom you trust. As the Director General of KEK, this was what Yoji Totsuka did to lead the future of high energy physics in Japan when ICFA announced the technolo choice for the ILC. He set up a vate ad hoc committee at KEK to discuss how Japan should play a major role in this international scientific project at an unprecedented scale.

Becau ILC's need t inform detect physic option for the

Scient world differe concep based and th Large calorir North ones a

is wa the s in Japa echnolog a priva discuss ajor role roject at

25 ired by ve director or AI) and EK. The bers ear of the lso

June 11, 2008
Advanced Accelerator Technology Forum

Federation of Suprapartisan Diet Members for solidifying a bid-to-host activity of ILC and for promoting advanced accelerator science

Kickoff Meeting :
July 31, 2008

Honors and Prizes

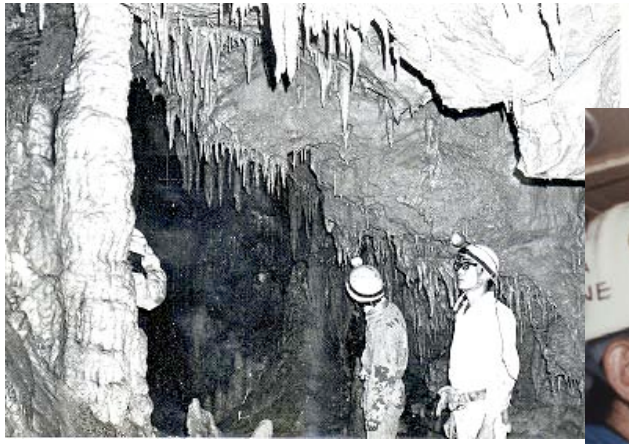
- Nishina Memorial Prize (1987)
- Asahi Prize : Kamiokande (1988)
- Bruno Rossi Prize (1989)
- Inoue Prize (1990)
- EPS Prize (1995)
- Asahi Prize : Super-Kamiokande (1999)
- Purple Ribbon Medal (2001)
- Panofsky Prize (2002)
- Fujiwara Prize (2002)
- Culture Merit (2002)
- Bruno Pontecorvo Prize (2003)
- Order of Culture (2004)
- Franklin medal (2007)

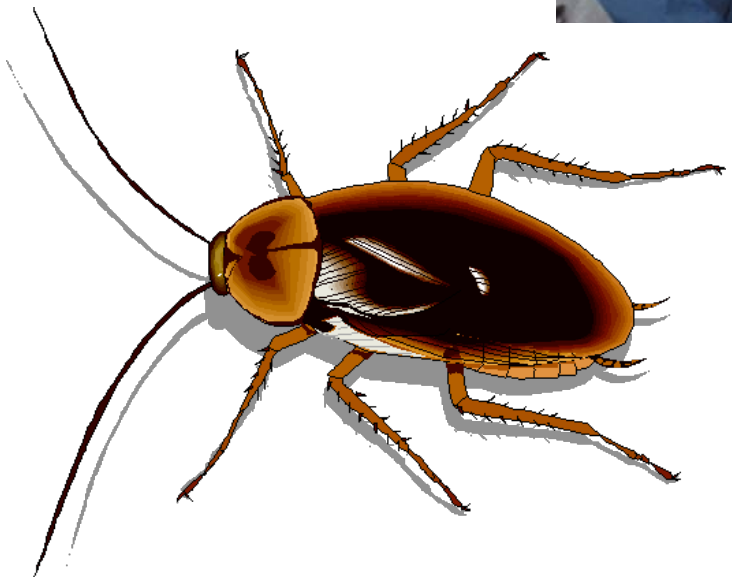
Two Weak Points

Claustrophobia

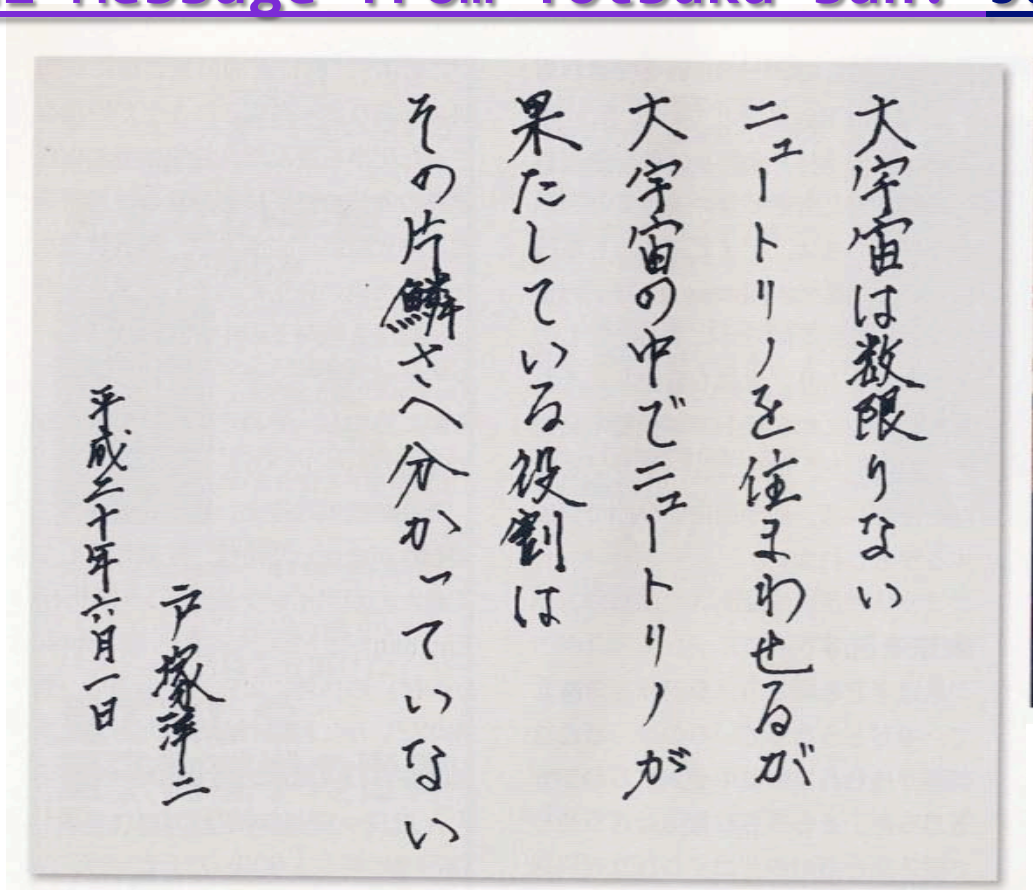
My image :

Cutting-in Commander



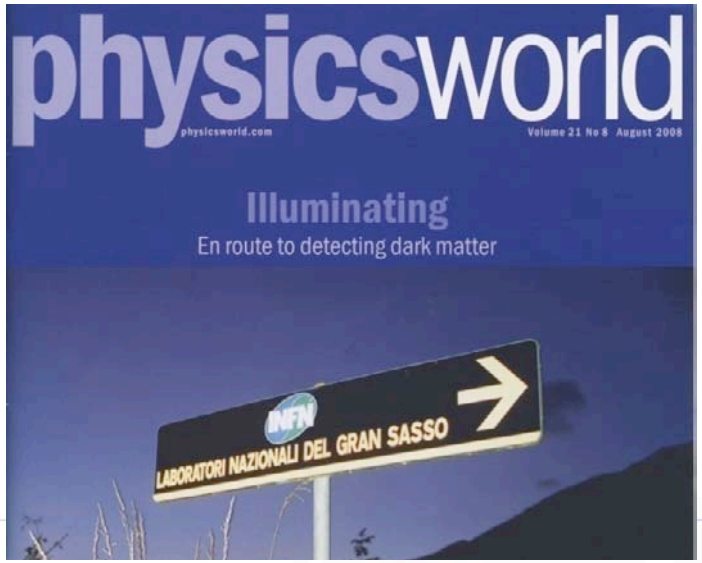


Final Message from Totsuka-san: June 1, 2008



"Universe is filled with astronomical number of neutrinos.

What a pity that we know only so little about the roles of neutrinos in the universe "



August 2008

People

Japanese particle-physics leader dies

Yoji Totsuka, former director general of the KEK particle-physics lab in Japan, died on 10 July at the age of 66. Totsuka, whose research interests were in the field of neutrino physics, served as KEK boss for three years from April 2003. After retiring in 2006, Totsuka became a professor emeritus at KEK and the University of Tokyo. His funeral on 12 July was attended by more than 500 people.

At KEK, Totsuka oversaw the Belle B-fac elect large then betw was a basel beam to th Kami Obse exper neutr one f

Be 2002 SuperKamiokande itself. Under Totsuka's leadership, the experiment recorded the first-ever evidence for neutrino oscillation by studying neutrinos produced in the upper atmosphere when cosmic rays strike air molecules. The finding indicated that neutrinos had mass, which until then were believed to be massless. Totsuka also oversaw the rebuilding of Super-Kamiokande after most of its 11 000 photomultiplier tubes blew up in a freak accident in November 2001.

Born on 6 March 1942, Totsuka the Order of Culture of Japan – one of the country's highest honours. Current KEK boss Atsuto Suzuki paid tribute to Totsuka, calling him an "outstanding physicist" and a "prominent leader both in non-accelerator and accelerator neutrino experiments". Although Suzuki admitted that the pair had "many discussions and sometimes quarrels", he praised Totsuka for being "very proactive in pushing forward international co-operation as members of many large particle laboratories".

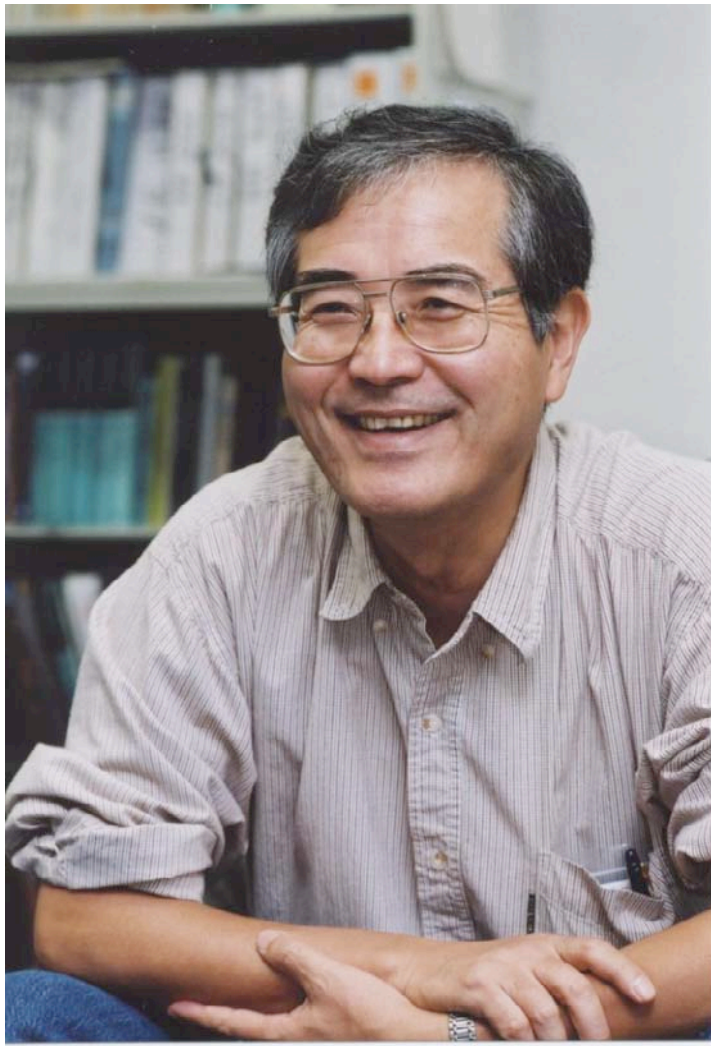
Neutrino pioneer Yoji Totsuka.

Dave Wark from Imperial College London, who is involved in plans to build an upgraded version of the K2K experiment known as T2K, also underlined Totsuka's importance to neutrino physics, adding that Totsuka could well have won a Nobel prize had he lived longer.

Dave Wark from Imperial College London, who is involved in plans to build an upgraded version of the K2K experiment known as T2K, also underlined Totsuka's importance to neutrino physics, adding that Totsuka could well have won a Nobel prize had he lived longer.

"His tenacity in getting Super-Kamiokande built and then rebuilt transformed our field, providing its premier detector and determining its direction," says Wark. "It is hard to overestimate the importance of SuperKamiokande to neutrino physics. Those of us who are involved with T2K will continue to owe our opportunity to make new world-leading measurements to his legacy. Without Totsuka the world of neutrino physics would be a very different and much less productive place. We have lost one of our best."

Matin Durrani



We really lost a big pillar.

We pay our last respects
to him.