FPA2013-40412

Luis A. Labarga Echeverría
Universidad Autónoma de Madrid

Física de neutrinos y desintegración del protón con Super-Kamiokande y la próxima generación de experimentos

15min. (Presentation + Discussion)

Madrid, 20140409

L. Labarga quick C.V.

Scientific research outside experimental neutrino physics:

- TASSO at PETRA (e+e- at 45 GeV c.m.e.),
- MARKII experiment at the SLC (e+e- at 100 GeV),
- ZEUS at HERA (ep at 300GeV),
- CDF at the TEVATRON (pp- at 2 TeV) and
- ATLAS at the LHC (pp at 14 TeV).
- Search for wimp-type Dark Matter by a collaboration with the Fermi-Lat satellite telescope

note: this is an experimental physics career

main responsible of

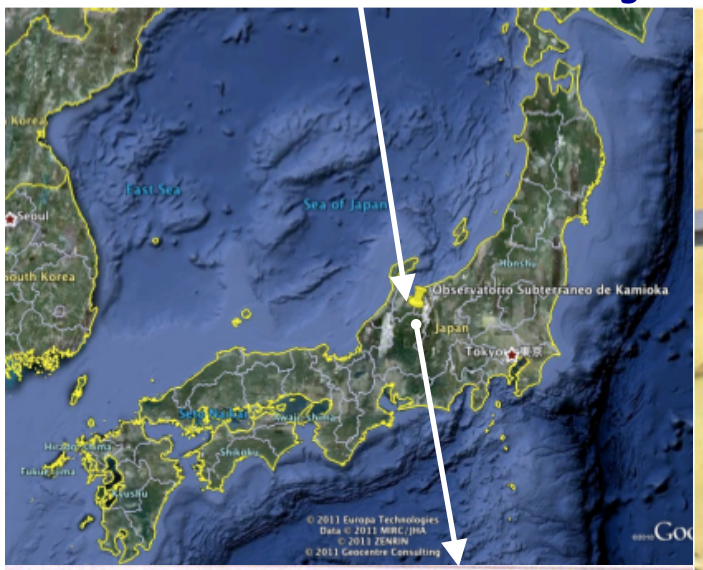
- development and construction of a significant part of the MARKII Silicon Strip Vertex Detector at the SLC and of its fully commissioning within the MARKII-SLC experiment
- the construction in the UAM of the three large drift chamber composing the ZEUS forward tracking detector at HERA; run coordinator of the chamber's test beam at DESY
- run coordination of the ZEUS experiment in 1993
- the construction of all the absorbers composing the ATLAS End- Cap Electromagnetic Calorimeter at the LHC, and of the construction of more than half of this detector in the UAM; run coordinator of the module's test beam at CERN.

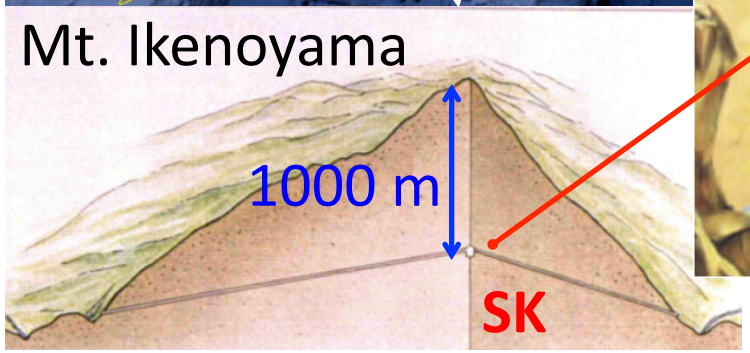
Author of 561 scientific publications, mean of 66.3 citations per publication (inSPIRE 20140215)
I.P. of NN research projects

Supervisor of 7 Ph.D. thesis; Most of his former students hold now high rank positions at the industry or at research centers. Currently supervising 2 more Ph.D. works

the core of the project is the *Super-Kamiokande* experiment at Kamioka Observatory of *The Institute for Cosmic Ray Research*, ICRR, U. Tokyo

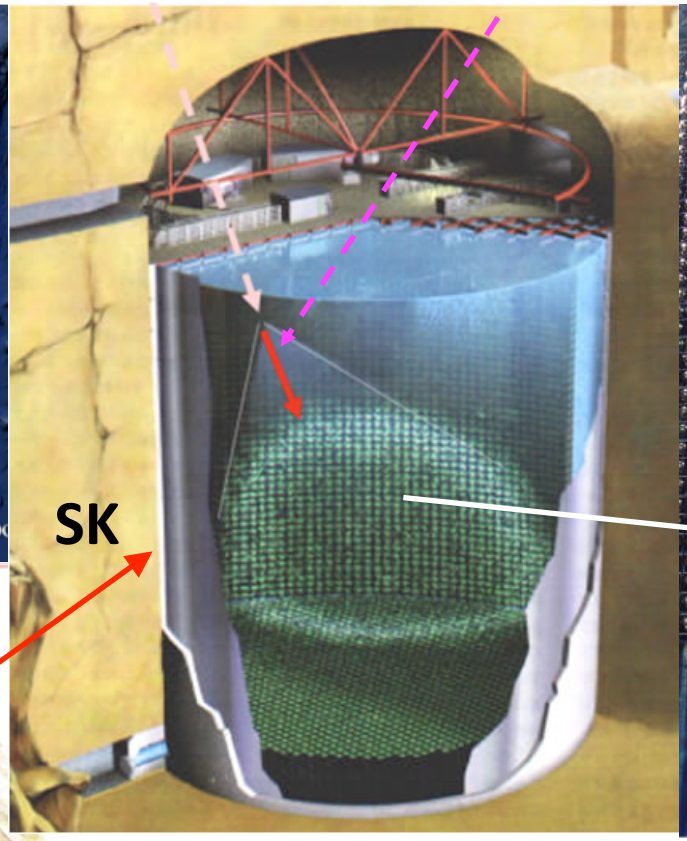
Kamioka Observatory



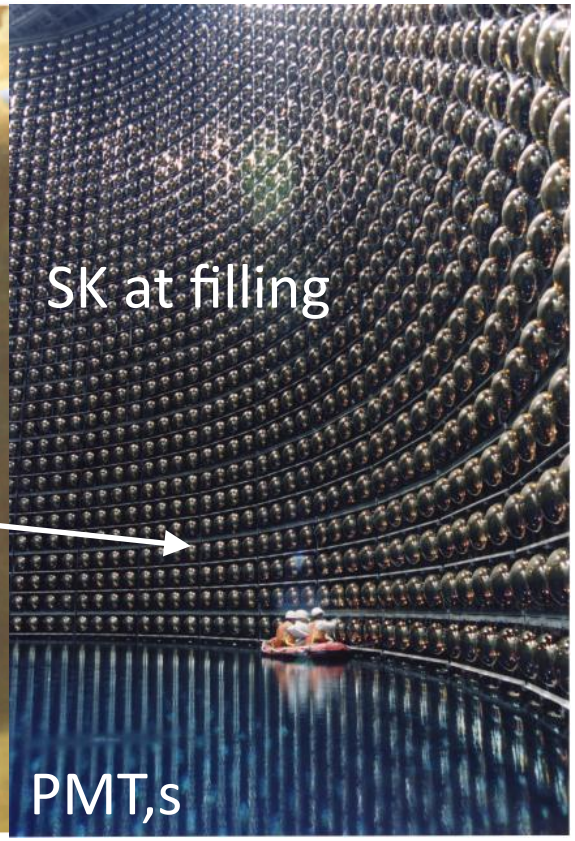


2700 m.w.e. overburden

SK measures *Cherenkov radiation*



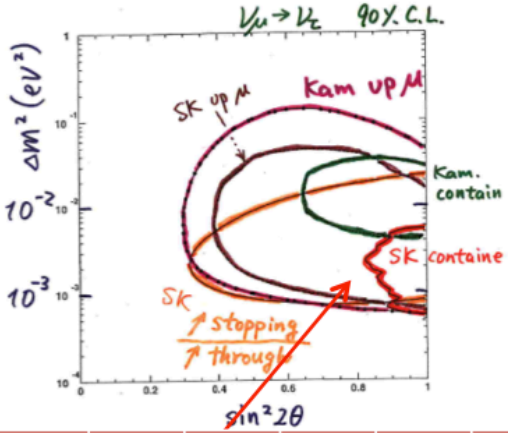
0.05 Mt water tank
40m ∅ x 40m H



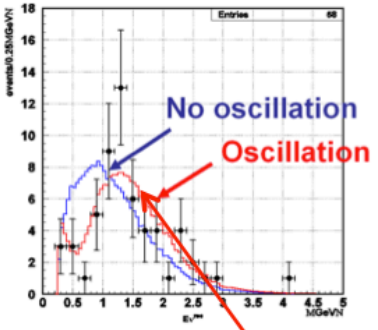
ID: 11148, 50cm ∅
OD: 1885, 20cm ∅

the project aims to continue and expand our full involvement in an experimental program that is providing major scientific achievements to HEP since almost two decades

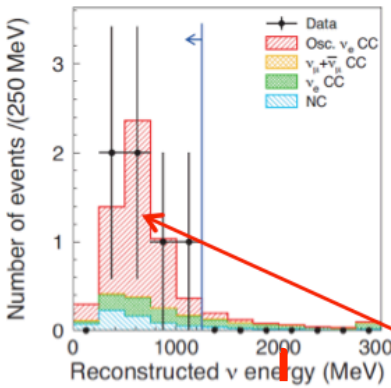
Atmospheric ν oscillations



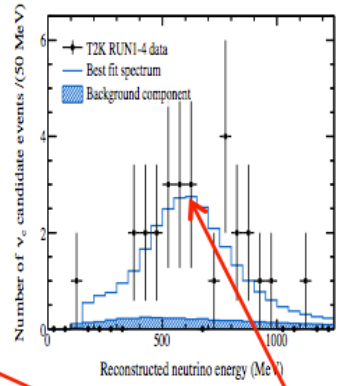
K2K confirmed atmospheric osc. by long baseline ν



indication θ_{13} by T2K

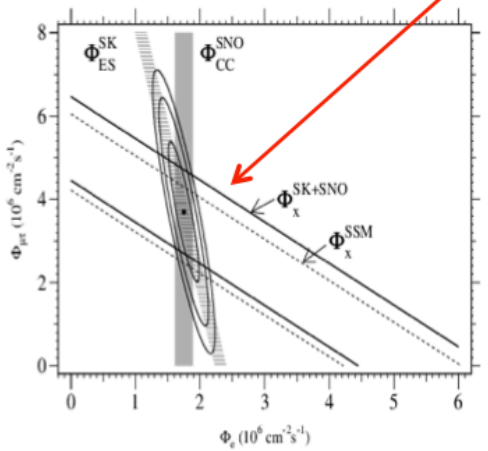


observation θ_{13} by T2K

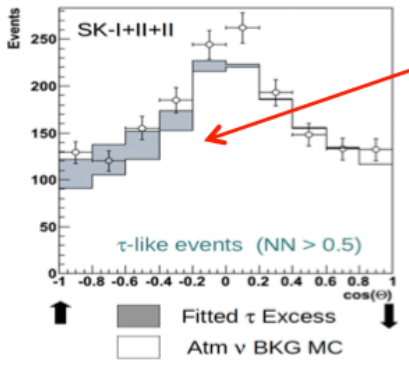


96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13

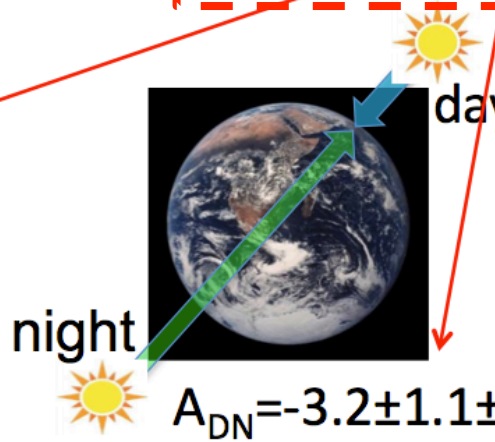
Solar ν oscillations



ν_τ appearance in atmospheric ν



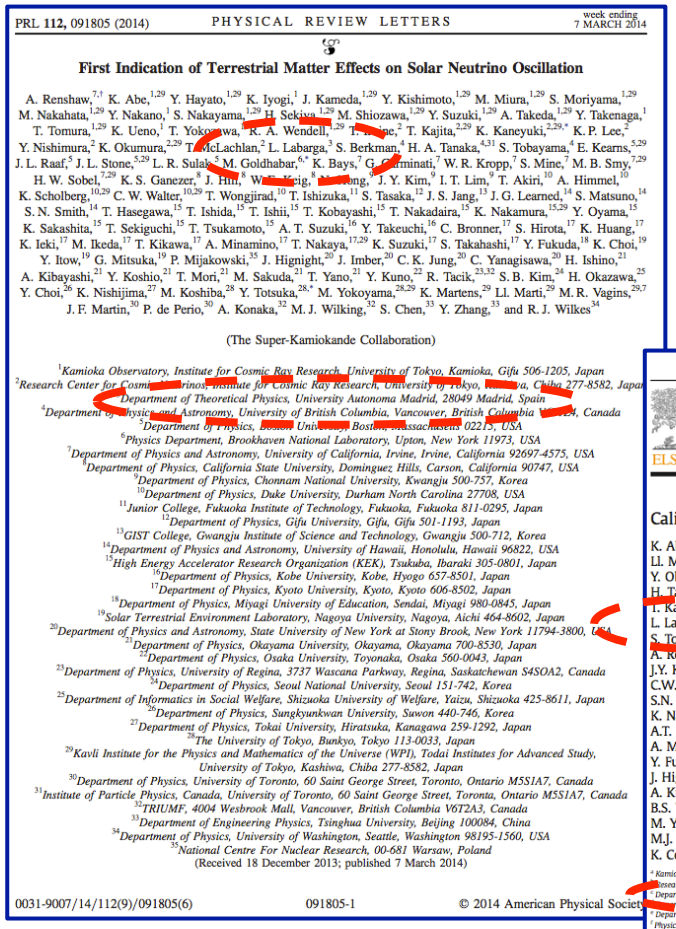
Solar day/night asymmetry



U.A.M. era

A_{DN}=-3.2±1.1±0.5 %

sample publications



PRL 112, 091805 (2014) PHYSICAL REVIEW LETTERS week ending 7 MARCH 2014

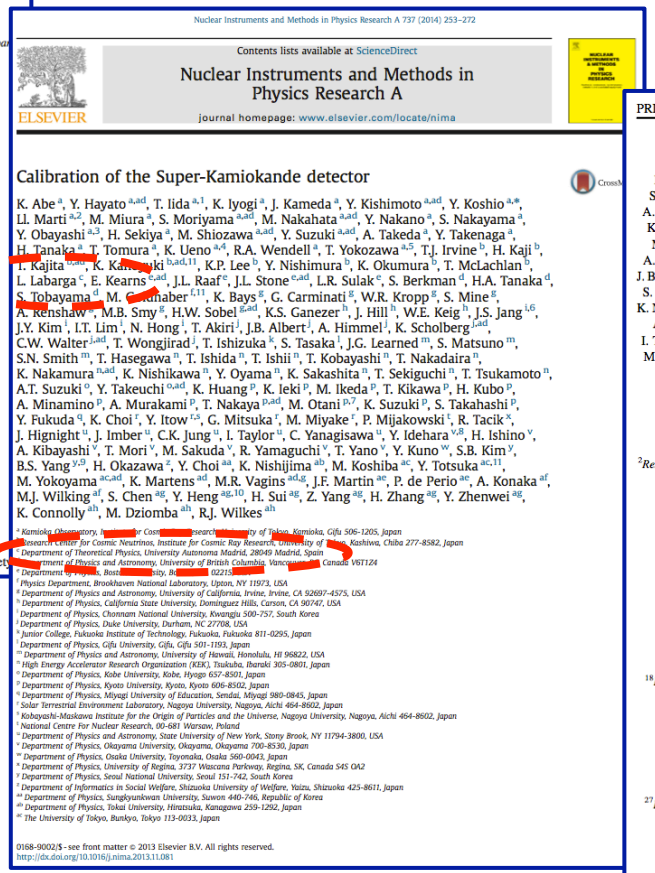
First Indication of Terrestrial Matter Effects on Solar Neutrino Oscillation

A. Renshaw,[7,†] K. Abe,[1,29] Y. Hayato,[1,29] K. Iyogi,[1] J. Kameda,[1,29] Y. Kishimoto,[1,29] M. Miura,[1,29] S. Moriyama,[1,29] M. Nakahata,[1,29] Y. Nakano,[1] S. Nakayama,[1,29] H. Sekiya,[1,29] M. Shiozawa,[1,29] Y. Suzuki,[1,29] A. Takeda,[1,29] Y. Takenaga,[1] T. Tomura,[1,29] K. Ueno,[1] T. Yokozawa,[1] R. A. Wendell,[1,29] T. Irvine,[2] T. Kajita,[2,29] K. Kaneyuki,[2,29,*] K. P. Lee,[2] Y. Nishimura,[2] K. Okumura,[2,29] T. McLachlan,[2] L. Labarga,[3] S. Berkman,[4] H. A. Tanaka,[4,31] S. Tobayama,[4] E. Kearns,[5,29] J. L. Raaf,[5] J. L. Stone,[5,29] L. R. Sulak,[5] M. Goldhaber,[6,*] K. Bays,[7] G. Carminati,[7] W. R. Kropp,[7] S. Mine,[7] M. B. Smy,[7,29] H. W. Sobel,[7,29] K. S. Ganezer,[8] J. Hill,[8] W. E. Keig,[8] J. S. Jang,[9] J. Y. Kim,[9] I. T. Lim,[9] T. Akiri,[10] A. Himmel,[10] K. Scholberg,[10,29] C. W. Walter,[10,29] T. Wongjirad,[10] T. Ishizuka,[11] S. Tasaka,[12] J. S. Jang,[13] J. G. Learned,[14] S. Matsuno,[14] S. N. Smith,[14] T. Hasegawa,[15] T. Ishida,[15] T. Ishii,[15] T. Kobayashi,[15] T. Nakadaira,[15] K. Nakamura,[15,29] Y. Oyama,[15] K. Sakashita,[15] T. Sekiguchi,[15] T. Tsukamoto,[15] A. T. Suzuki,[16] Y. Takeuchi,[16] C. Bronner,[17] S. Hirota,[17] K. Huang,[17] K. Ieki,[17] M. Ikeda,[17] T. Kikawa,[17] A. Minamino,[17] T. Nakaya,[17,29] K. Suzuki,[17] S. Takahashi,[17] Y. Fukuda,[18] K. Choi,[19] Y. Itow,[19] G. Mitsuka,[19] P. Mijakowski,[35] J. Hignight,[20] J. Imber,[20] C. K. Jung,[20] C. Yanagisawa,[20] H. Ishino,[21] A. Kibayashi,[21] Y. Koshio,[21] T. Mori,[21] M. Sakuda,[21] T. Yano,[21] Y. Kuno,[22] R. Tacik,[23,32] S. B. Kim,[24] H. Okazawa,[25] Y. Choi,[26] K. Nishijima,[27] M. Koshiba,[28] Y. Totsuka,[28,*] M. Yokoyama,[28,29] K. Martens,[29] Ll. Marti,[29] M. R. Vagins,[29,7] J. F. Martin,[30] P. de Perio,[30] A. Konaka,[32] M. J. Wilking,[32] S. Chen,[33] Y. Zhang,[33] and R. J. Wilkes[34]

(The Super-Kamiokande Collaboration)

[1]*Kamioka Observatory, Institute for Cosmic Ray Research, University of Tokyo, Kamioka, Gifu 506-1205, Japan*
[2]*Research Center for Cosmic Neutrinos, Institute for Cosmic Ray Research, University of Tokyo, Kashiwa, Chiba 277-8582, Japan*
Department of Theoretical Physics, University Autonoma Madrid, 28049 Madrid, Spain
[4]*Department of Physics and Astronomy, University of British Columbia, Vancouver, British Columbia V6T1Z4, Canada*
[5]*Department of Physics, Boston University, Boston, Massachusetts 02215, USA*
[6]*Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA*
[7]*Department of Physics and Astronomy, University of California, Irvine, Irvine, California 92697-4575, USA*
[8]*Department of Physics, California State University, Dominguez Hills, Carson, California 90747, USA*
[9]*Department of Physics, Chonnam National University, Kwangju 500-757, Korea*
[10]*Department of Physics, Duke University, Durham North Carolina 27708, USA*
[11]*Junior College, Fukuoka Institute of Technology, Fukuoka, Fukuoka 811-0295, Japan*
[12]*Department of Physics, Gifu University, Gifu, Gifu 501-1193, Japan*
[13]*GIST College, Gwangju Institute of Science and Technology, Gwangju 500-712, Korea*
[14]*Department of Physics and Astronomy, University of Hawaii, Honolulu, Hawaii 96822, USA*
[15]*High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305-0801, Japan*
[16]*Department of Physics, Kobe University, Kobe, Hyogo 657-8501, Japan*
[17]*Department of Physics, Kyoto University, Kyoto, Kyoto 606-8502, Japan*
[18]*Department of Physics, Miyagi University of Education, Sendai, Miyagi 980-0845, Japan*
[19]*Solar Terrestrial Environment Laboratory, Nagoya University, Nagoya, Aichi 464-8602, Japan*
[20]*Department of Physics and Astronomy, State University of New York at Stony Brook, New York 11794-3800, USA*
[21]*Department of Physics, Okayama University, Okayama, Okayama 700-8530, Japan*
[22]*Department of Physics, Osaka University, Toyonaka, Osaka 560-0043, Japan*
[23]*Department of Physics, University of Regina, 3737 Wascana Parkway, Regina, Saskatchewan S4SOA2, Canada*
[24]*Department of Physics, Seoul National University, Seoul 151-742, Korea*
[25]*Department of Informatics in Social Welfare, Shizuoka University of Welfare, Yaizu, Shizuoka 425-8611, Japan*
[26]*Department of Physics, Sungkyunkwan University, Suwon 440-746, Korea*
[27]*Department of Physics, Tokai University, Hiratsuka, Kanagawa 259-1292, Japan*
[28]*The University of Tokyo, Bunkyo, Tokyo 113-0033, Japan*
[29]*Kavli Institute for the Physics and Mathematics of the Universe (WPI), Todai Institutes for Advanced Study, University of Tokyo, Kashiwa, Chiba 277-8582, Japan*
[30]*Department of Physics, University of Toronto, 60 Saint George Street, Toronto, Ontario M5S1A7, Canada*
[31]*Institute of Particle Physics, Canada, University of Toronto, 60 Saint George Street, Toronto, Ontario M5S1A7, Canada*
[32]*TRIUMF, 4004 Wesbrook Mall, Vancouver, British Columbia V6T2A3, Canada*
[33]*Department of Engineering Physics, Tsinghua University, Beijing 100084, China*
[34]*Department of Physics, University of Washington, Seattle, Washington 98195-1560, USA*
[35]*National Centre For Nuclear Research, 00-681 Warsaw, Poland*

(Received 18 December 2013; published 7 March 2014)



Nuclear Instruments and Methods in Physics Research A 737 (2014) 253–272

Contents lists available at ScienceDirect

Nuclear Instruments and Methods in Physics Research A

journal homepage: www.elsevier.com/locate/nima

Calibration of the Super-Kamiokande detector

K. Abe [a], Y. Hayato [a,ad], T. Iida [a,1], K. Iyogi [a], J. Kameda [a], Y. Kishimoto [a,ad], Y. Koshio [a,*], Ll. Marti [a,2], M. Miura [a], S. Moriyama [a,ad], M. Nakahata [a,ad], Y. Nakano [a], S. Nakayama [a], Y. Obayashi [a,3], H. Sekiya [a], M. Shiozawa [a,ad], Y. Suzuki [a,ad], A. Takeda [a], Y. Takenaga [a], H. Tanaka [a], T. Tomura [a], K. Ueno [a,4], R.A. Wendell [a], T. Yokozawa [a,5], T.J. Irvine [b], H. Kaji [b], T. Kajita [b,ad], K. Kaneyuki [b,ad,11], K.P. Lee [b], Y. Nishimura [b], K. Okumura [b], T. McLachlan [b], L. Labarga [c], E. Kearns [e,ad], J.L. Raaf [e], J.L. Stone [e,ad], L.R. Sulak [e], S. Berkman [d], H.A. Tanaka [d], S. Tobayama [d], M. Goldhaber [f,11], K. Bays [g], G. Carminati [g], W.R. Kropp [g], S. Mine [g], A. Renshaw [g], M.B. Smy [g], H.W. Sobel [g,ad], K.S. Ganezer [h], J. Hill [h], W.E. Keig [h], J.S. Jang [i,6], J.Y. Kim [i], I.T. Lim [i], N. Hong [i], T. Akiri [j], J.B. Albert [j], A. Himmel [j], K. Scholberg [j,ad], C.W. Walter [j,ad], T. Wongjirad [j], T. Ishizuka [k], S. Tasaka [l], J.G. Learned [m], S. Matsuno [m], S.N. Smith [m], T. Hasegawa [n], T. Ishida [n], T. Ishii [n], T. Kobayashi [n], T. Nakadaira [n], K. Nakamura [n,ad], K. Nishikawa [n], Y. Oyama [n], K. Sakashita [n], T. Sekiguchi [n], T. Tsukamoto [n], A.T. Suzuki [o], Y. Takeuchi [o,ad], K. Huang [p], K. Ieki [p], M. Ikeda [p], T. Kikawa [p], H. Kubo [p], A. Minamino [p], A. Murakami [p], T. Nakaya [p,ad], M. Otani [p,7], K. Suzuki [p], S. Takahashi [p], Y. Fukuda [q], K. Choi [r], Y. Itow [r,8], G. Mitsuka [r], M. Miyake [r], P. Mijakowski [r], R. Tacik [x], J. Hignight [u], J. Imber [u], C.K. Jung [u], I. Taylor [u], C. Yanagisawa [u], Y. Idehara [v,8], H. Ishino [v], A. Kibayashi [v], T. Mori [v], M. Sakuda [v], R. Yamaguchi [v], T. Yano [v], Y. Kuno [w], S.B. Kim [y], B.S. Yang [y,9], H. Okazawa [z], Y. Choi [aa], K. Nishijima [ab], M. Koshiba [ac], Y. Totsuka [ac,11], M. Yokoyama [ac,ad], K. Martens [ad], M.R. Vagins [ad,g], J.F. Martin [ae], P. de Perio [ae], A. Konaka [af], M.J. Wilking [af], S. Chen [ag], Y. Heng [ag,10], H. Sui [ag], Z. Yang [ag], H. Zhang [ag], Y. Zhenwei [ag], K. Connolly [ah], M. Dziomba [ah], R.J. Wilkes [ah]

[a] Kamioka Observatory, Institute for Cosmic Ray Research, University of Tokyo, Kamioka, Gifu 506-1205, Japan
[b] Research Center for Cosmic Neutrinos, Institute for Cosmic Ray Research, University of Tokyo, Kashiwa, Chiba 277-8582, Japan
[c] Department of Theoretical Physics, University Autonoma Madrid, 28049 Madrid, Spain
[d] Department of Physics and Astronomy, University of British Columbia, Vancouver, BC, Canada V6T1Z4
[e] Department of Physics, Boston University, Boston, MA 02215, USA
[f] Physics Department, Brookhaven National Laboratory, Upton, NY 11973, USA
[g] Department of Physics and Astronomy, University of California, Irvine, Irvine, CA 92697-4575, USA
[h] Department of Physics, California State University, Dominguez Hills, Carson, CA 90747, USA
[i] Department of Physics, Chonnam National University, Kwangju 500-757, South Korea
[j] Department of Physics, Duke University, Durham, NC 27708, USA
[k] Junior College, Fukuoka Institute of Technology, Fukuoka, Fukuoka 811-0295, Japan
[l] Department of Physics, Gifu University, Gifu, Gifu 501-1193, Japan
[m] Department of Physics and Astronomy, University of Hawaii, Honolulu, HI 96822, USA
[n] High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305-0801, Japan
[o] Department of Physics, Kobe University, Kobe, Hyogo 657-8501, Japan
[p] Department of Physics, Kyoto University, Kyoto, Kyoto 606-8502, Japan
[q] Department of Physics, Miyagi University of Education, Sendai, Miyagi 980-0845, Japan
[r] Solar Terrestrial Environment Laboratory, Nagoya University, Nagoya, Aichi 464-8602, Japan
[s] Kobayashi-Maskawa Institute for the Origin of Particles and the Universe, Nagoya University, Nagoya, Aichi 464-8602, Japan
[t] National Centre For Nuclear Research, 00-681 Warsaw, Poland
[u] Department of Physics and Astronomy, State University of New York, Stony Brook, NY 11794-3800, USA
[v] Department of Physics, Okayama University, Okayama, Okayama 700-8530, Japan
[w] Department of Physics, Osaka University, Toyonaka, Osaka 560-0043, Japan
[x] Department of Physics, University of Regina, 3737 Wascana Parkway, Regina, SK, Canada S4S 0A2
[y] Department of Physics, Seoul National University, Seoul 151-742, South Korea
[z] Department of Informatics in Social Welfare, Shizuoka University of Welfare, Yaizu, Shizuoka 425-8611, Japan
[aa] Department of Physics, Sungkyunkwan University, Suwon 440-746, Republic of Korea
[ab] Department of Physics, Tokai University, Hiratsuka, Kanagawa 259-1292, Japan
[ac] The University of Tokyo, Bunkyo, Tokyo 113-0033, Japan

0168-9002/$ - see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.nima.2013.11.081

PRL 110, 181802 (2013) PHYSICAL REVIEW LETTERS week ending 3 MAY 2013

Evidence for the Appearance of Atmospheric Tau Neutrinos in Super-Kamiokande

K. Abe,[1,27] Y. Hayato,[1,27] T. Iida,[1] K. Iyogi,[1] J. Kameda,[1,27] Y. Koshio,[1,27] Y. Kozuma,[1] Ll. Marti,[1] M. Miura,[1,27] S. Moriyama,[1,27] M. Nakahata,[1,27] S. Nakayama,[1,27] Y. Obayashi,[1,27] H. Sekiya,[1,27] M. Shiozawa,[1,27] Y. Suzuki,[1,27] A. Takeda,[1,27] Y. Takenaga,[1] K. Ueno,[1] K. Ueshima,[1] S. Yamada,[1] T. Yokozawa,[1] C. Ishihara,[2] H. Kaji,[2] T. Kajita,[2,27] K. Kaneyuki,[2,27,*] K. P. Lee,[2] T. McLachlan,[2] K. Okumura,[2] Y. Shimizu,[2] N. Tanimoto,[2] L. Labarga,[3] E. Kearns,[4,27] M. Litos,[4] J. L. Raaf,[4] J. L. Stone,[4,27] L. R. Sulak,[4] M. Goldhaber,[5,*] K. Bays,[6] W. R. Kropp,[6] S. Mine,[6] C. Regis,[6] A. Renshaw,[6] M. B. Smy,[6,27] H. W. Sobel,[6,27] K. S. Ganezer,[7] J. Hill,[7] W. E. Keig,[7] J. S. Jang,[8,†] J. Y. Kim,[8] I. T. Lim,[8] J. B. Albert,[9] K. Scholberg,[9,27] C. W. Walter,[9,27] R. Wendell,[9] T. M. Wongjirad,[9] T. Ishizuka,[10] S. Tasaka,[11] J. G. Learned,[12] S. Matsuno,[12] S. N. Smith,[12] T. Hasegawa,[13] T. Ishida,[13] T. Ishii,[13] T. Kobayashi,[13] T. Nakadaira,[13] K. Nakamura,[13,27] K. Nishikawa,[13] Y. Oyama,[13] K. Sakashita,[13] T. Sekiguchi,[13] T. Tsukamoto,[13] A. T. Suzuki,[14] Y. Takeuchi,[14,27] M. Ikeda,[15] A. Minamino,[15] T. Nakaya,[15,27] Y. Fukuda,[16] Y. Itow,[17,18] G. Mitsuka,[17] T. Tanaka,[17] C. K. Jung,[19] G. D. Lopez,[19] I. Taylor,[19] C. Yanagisawa,[19] H. Ishino,[20] A. Kibayashi,[20] S. Mino,[20] T. Mori,[20] M. Sakuda,[20] H. Toyota,[20] Y. Kuno,[21] M. Yoshida,[21] S. B. Kim,[22] B. S. Yang,[22] H. Okazawa,[23] Y. Choi,[24] K. Nishijima,[25] M. Koshiba,[26] M. Yokoyama,[26,27] Y. Totsuka,[26,*] K. Martens,[27] J. Schuemann,[27] M. R. Vagins,[27,6] S. Chen,[28] Y. Heng,[28] Z. Yang,[28] H. Zhang,[28] D. Kielczewska,[29] P. Mijakowski,[30] K. Connolly,[31] M. Dziomba,[31] E. Thrane,[31,‡] and R. J. Wilkes[31]

(Super-Kamiokande Collaboration)

[1]*Kamioka Observatory, Institute for Cosmic Ray Research, University of Tokyo, Kamioka, Gifu 506-1205, Japan*
[2]*Research Center for Cosmic Neutrinos, Institute for Cosmic Ray Research, University of Tokyo, Kashiwa, Chiba 277-8582, Japan*
[3]*Department of Theoretical Physics, University Autonoma Madrid, 28049 Madrid, Spain*
[4]*Department of Physics, Boston University, Boston, Massachusetts 02215, USA*
[5]*Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA*
[6]*Department of Physics and Astronomy, University of California Irvine, Irvine, California 92697-4575, USA*
[7]*Department of Physics, California State University, Dominguez Hills, Carson, California 90747, USA*
[8]*Department of Physics, Chonnam National University, Kwangju 500-757, Korea*
[9]*Department of Physics, Duke University, Durham, North Carolina 27708, USA*
[10]*Junior College, Fukuoka Institute of Technology, Fukuoka 811-0214, Japan*
[11]*Information and Multimedia Center, Gifu University, Gifu, Gifu 501-1193, Japan*
[12]*Department of Physics and Astronomy, University of Hawaii, Honolulu, Hawaii 96822, USA*
[13]*High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305-0801, Japan*
[14]*Department of Physics, Kobe University, Kobe, Hyogo 657-8501, Japan*
[15]*Department of Physics, Kyoto University, Kyoto, Kyoto 606-8502, Japan*
[16]*Department of Physics, Miyagi University of Education, Sendai, Miyagi 980-0845, Japan*
[17]*Solar Terrestrial Environment Laboratory, Nagoya University, Nagoya, Aichi 464-8602, Japan*
[18]*Kobayashi-Maskawa Institute for the Origin of Particle and the Universe, Nagoya University, Nagoya, Aichi 464-8602, Japan*
[19]*Department of Physics and Astronomy, State University of New York, Stony Brook, New York 11794-3800, USA*
[20]*Department of Physics, Okayama University, Okayama, Okayama 700-8530, Japan*
[21]*Department of Physics, Osaka University, Toyonaka, Osaka 560-0043, Japan*
[22]*Department of Physics, Seoul National University, Seoul 151-742, Korea*
[23]*Department of Informatics in Social Welfare, Shizuoka University of Welfare, Yaizu, Shizuoka 425-8611, Japan*
[24]*Department of Physics, Sungkyunkwan University, Suwon 440-746, Korea*
[25]*Department of Physics, Tokai University, Hiratsuka, Kanagawa 259-1292, Japan*
[26]*The University of Tokyo, Bunkyo, Tokyo 113-0033, Japan*
[27]*Kavli Institute for the Physics and Mathematics of the Universe (WPI), University of Tokyo, Kashiwa, Chiba 277-8583, Japan*
[28]*Department of Engineering Physics, Tsinghua University, Beijing 100084, China*
[29]*Institute of Experimental Physics, Warsaw University, 00-681 Warsaw, Poland*
[30]*National Centre For Nuclear Research, 00-681 Warsaw, Poland*
[31]*Department of Physics, University of Washington, Seattle, Washington 98195-1560, USA*

(Received 5 June 2012; published 2 May 2013)

Super-Kamiokande atmospheric neutrino data were fit with an unbinned maximum likelihood method to search for the appearance of tau leptons resulting from the interactions of oscillation-generated tau neutrinos in the detector. Relative to the expectation of unity, the tau normalization is found to be $1.42 \pm 0.35(\mathrm{stat})^{+0.14}_{-0.12}(\mathrm{syst})$ excluding the no-tau-appearance hypothesis, for which the normalization would be

KEK-JAPAN
日本高エネルギー加速器研究機構

KRISS
Korea Research Institute of Standards and Science
韓国標準科学研究院

UNIVERSITY OF WARSAW
ワルシャワ大学

東京大学
THE UNIVERSITY OF TOKYO

YNU
横浜国立大学
Yokohama National University

TRIUMF
カナダ TRIUMF 研究所

Sejong University
セジョン大学

University of California, Irvine
カリフォルニア大学アーバイン校

SungKyunKwan University
成均館大学

京都大学
KYOTO UNIVERSITY

BOSTON UNIVERSITY
Boston University
ボストン大学

神戸大学
Kobe University

岐阜大学
Gifu University

名古屋大学
NAGOYA UNIVERSITY

SEOUL NATIONAL UNIVERSITY
ソウル大学

宮城教育大学
Miyagi University of Education

清華大学
Tsinghua University

University of Regina
University of Regina
レジャイナ大学

Duke university
デューク大学

Chonnam National University
全南大学

UBC
University of British Columbia

Stony Brook University
ニューヨーク州立大学

UAM
UNIVERSIDAD AUTÓNOMA DE MADRID
マドリッド・オートノマ大学

California State University
DOMINGUEZ HILLS
カリフォルニア州立大学

UNIVERSITY of HAWAI'I MĀNOA
ハワイ大学

UNIVERSITY OF TORONTO
トロント大学

KAVLI IPMU
東京大学カブリ IPMU
Kavli IPMU, University of Tokyo

Super-Kamiokande **is a rather mature Collaboration formed mainly by institutes from Japan and the U.S.A.; it has also a significant contribution from Canada, China, Korea, Poland and *Spain***

[from Kamioka Observatory's Leaflet]

the project seeks help

1. to continue
2. and expand

our full involvement in an experimental program that is currently tackling truly fundamental problems in Basic Science, remarkably,

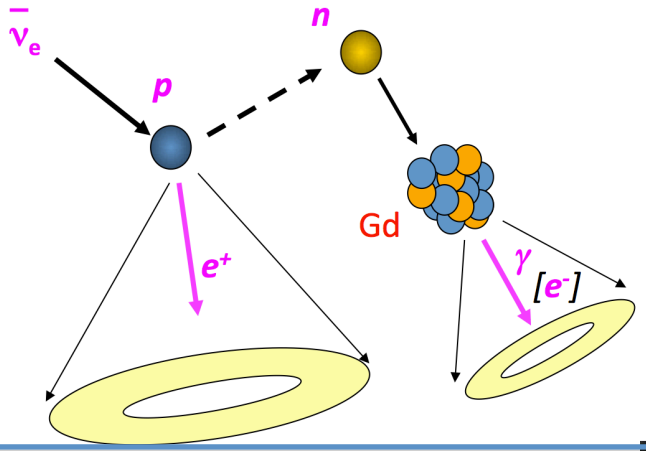
- solar ν flux,
- matter effects in ν oscillations,
- precise measurement of leptonic mixing matrix elements
- neutrino Mass Hierarchy (MH),
- neutrino CP Violation,
- Dirac or *Majorana* nature of the neutrino,

- Grand Unification Theories; search for Proton Decay,

- Diffuse Supernova Neutrino Background (DSNB); evolution of the Universe, star formation, neutrino interactions
- nearby Galactic Supernova; neutrino physics at very high temperature and density

and the R&D program [*EGADS*] to provide SK and the Next Generation Water-Cherenkov (WC) detectors, the ability to distinguish the character anti- / particle of the interacting ν

Gadzooks!



e^+ is detected

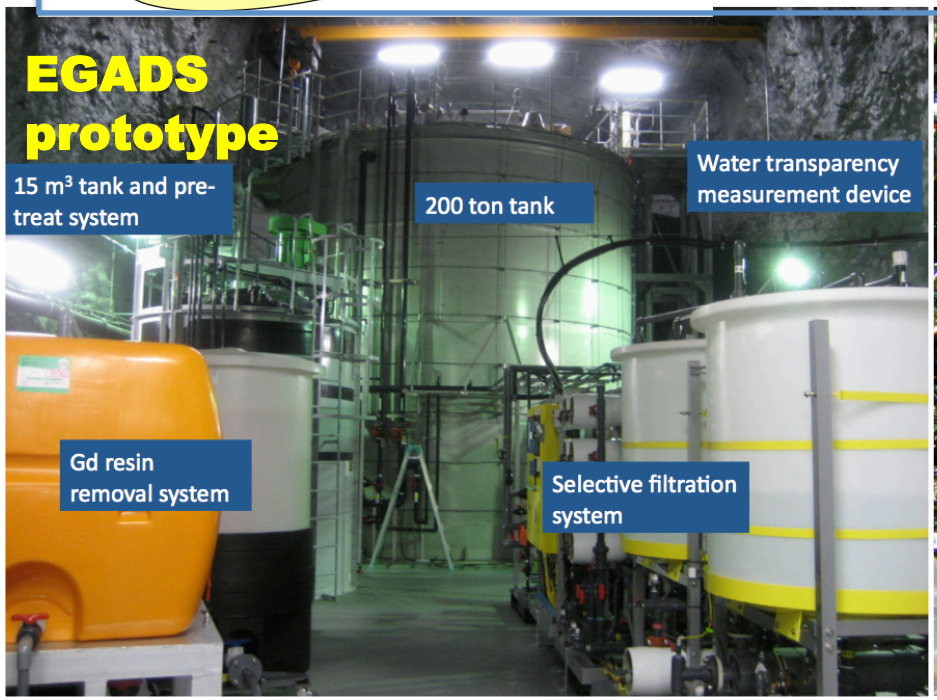
n wanders around for ~12μs until thermalises

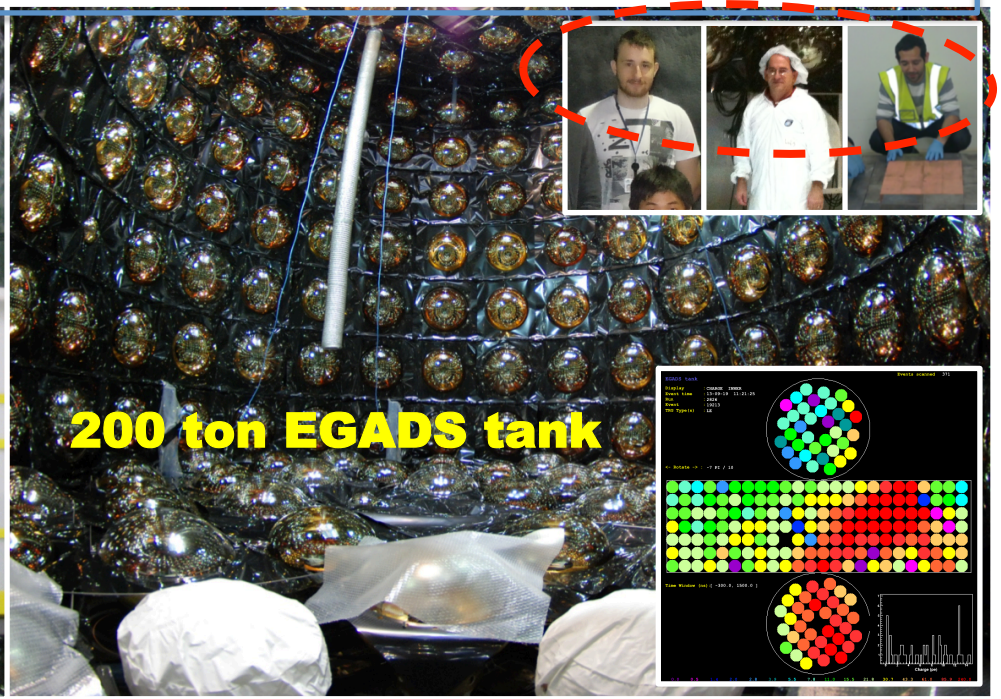
~ 20μs [50cm] until Gd-capture

8 MeV γ,s cascade

e^- are Compton-scat. off the γ and detected

$\bar{\nu}_e$ is identified from coincidence [e^+, delayed e^-]





the ability to distinguish the character anti- / particle of the interacting ν will open SK and its next generation detector a whelm of top interest processes like

• *Diffuse Supernova Neutrino Background*: discovery by SK, measurement of E spectrum by HK

• *leptonic mixing matrix*: precise measurement of the solar elements from nuclear reactor electron anti-ν

• *Mass Hierarchy*: increase sensitivity from atmospheric ν and anti-ν traversing the earth before interacting in the detector (indication by SK, establishment by HK ??)

• *Proton Decay searches*: increase the sensitivity for

EGADS / Gadzooks! team

Kamioka Observatory, ICRR, Uni. of Tokyo

M. Ikeda, Y. Kishimoto, M. Nakahata, H. Sekiya

Kavli IPMU, Uni. of Tokyo

Ll. Marti, M. Vagins

Okayama University

H. Ishino, A. Kibayashi, Y. Koshio. T. Mori, T. Yano, M. Sakuda

Kobe University

Y. Takeuchi

U.A.M.

P. Fernández, L. Labarga, J. Pérez

Uni. of California Irvine

G. Carminati, W .Kropp, A. Renshaw, M. Smy, P. Weatherly, J. Griskevich

LowNu2009

"*Workshop on Low Energy Neutrino Physics 2010", Reims, Oct. 2009*
Lluis Marti, *on behalf of the Super-Kamiokande Collaboration,*
"Super-Kamiokande"

CEC2010

"The Cracow Epiphany Conference 2010"; Cracow, January 2010
Luis Labarga, "Laguna and the LSC"

CSSP2010

"Carpathian Summer School of Physics 2010"; Sinaia, July 2010
Luis Labarga, "About a Gd-doped Water Cherenkov LAGUNA detec."

NOW2010

"Neutrino Oscillation Workshop 2010"; Lecce, Italy, September 2010
Lluis Marti, *on behalf of the Super-Kamiokande Collaboration,*
"Status of the Gadolinium Project for Super-Kamiokande"

IMFP2011

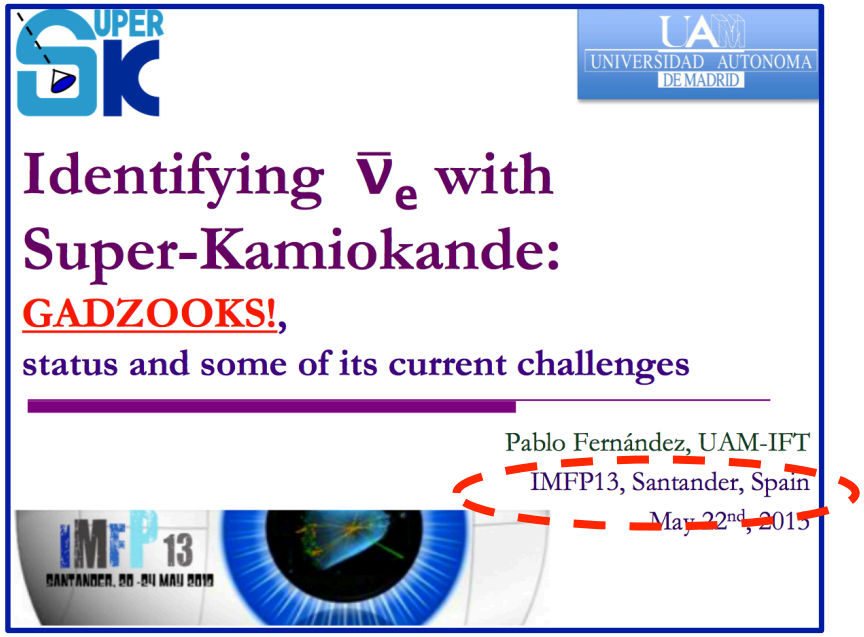
"34th International Meeting on Fundamental Physics"; Canfranc, Feb. 2010
Luis Labarga, "Laguna and the LSC"

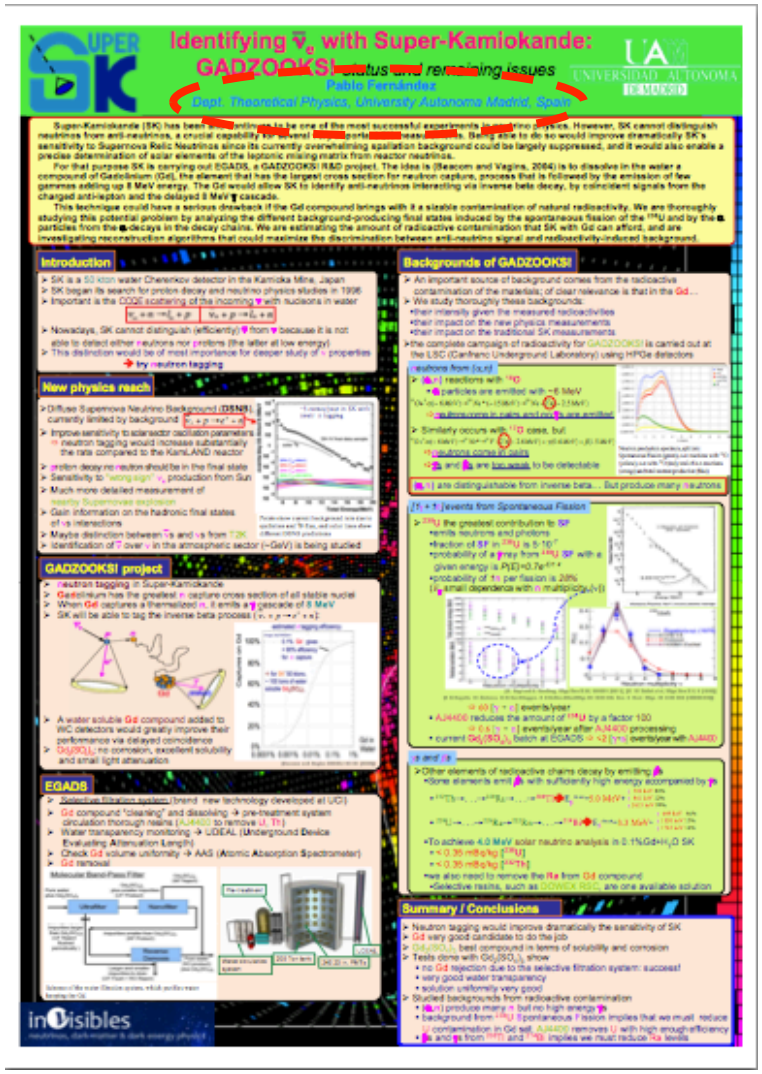
ICRC2011

"32nd International Cosmic Ray Conference"; Beijing, August 2011

Lluis Marti, *on behalf of the Super-Kamiokande Collaboration,*

"Evaluating Gadolinium for use in Super-Kamiokande"





Subject: Re: Abstract submission for ICHEP2014
Date: Sat, 5 Apr 2014 16:45:21 +0900
From: Masayuki Nakahata <nakahata@suketto.icrr.u-tokyo.ac.jp>
To: Pablo Fernández Menéndez <pablo.fernandezm01@estudiante.uam.es>, Hiroyuki Sekiya <sekiya@icrr.u-tokyo.ac.jp>
CC: Mark Vagins <vagins@markie.ps.uci.edu>

Dear Sekiya-San and Pablo,

The abstract submission to ICHEP2014 was approved by the executive committee.

M. Nakahata

2014/04/01 20:14、Masayuki Nakahata <nakahata@suketto.icrr.u-tokyo.ac.jp> のメッセージ:

SUPERKGD - Exp-06-2009

Very low background measurements for Super-Kamiokande

Responsible Institute: University Autónoma, Madrid

Supporting Institutes: Institute for Cosmic Ray Research, Tokyo; Institute for the Physics and Mathematics of the Universe, Tokyo; University California Irvine

Super-Kamiokande (SK) is the world's most powerful scientific apparatus for proton decay and neutrino physics. It operates in the Kamioka underground observatory in Japan. SK discovered neutrino oscillations in neutrinos from cosmic rays collisions in the atmosphere, contributed to solve the solar neutrino problem, measured elements of the neutrino mixing, and observed neutrino oscillations in an artificial neutrino beam produced at 230 km distance for the first time (K2K experiment). It is taking data on a neutrino beam from the JPARK Laboratory. SK currently provides the world's best limit on proton decay. SK pioneered the field of neutrino astronomy, giving, in particular, the most restrictive upper limit on the ubiquitous neutrinos originated in the past Supernova (Diffuse Supernova Neutrino Background: DSNB) explosions.

SK uses the water-Cherenkov technique, which allows to instrument large amounts of active mass with a reliable, understood and low cost technology. Despite of its success, the technology has, however, a drawback: its inability to detect low energy neutrons, which would be extremely important to "tag" the antineutrino induced reaction $\bar{\nu}_e + p \rightarrow e^+ + n$.

The SK Collaboration has setup a strong R&D program towards the high efficiency detection of neutrons, by solving in the water a gadolinium (Gd) salt. The Gd nuclei have a large probability to

.....

.....

@

LSC

Laboratorio Subterráneo de Canfranc

report to LSC-SC every half a year:

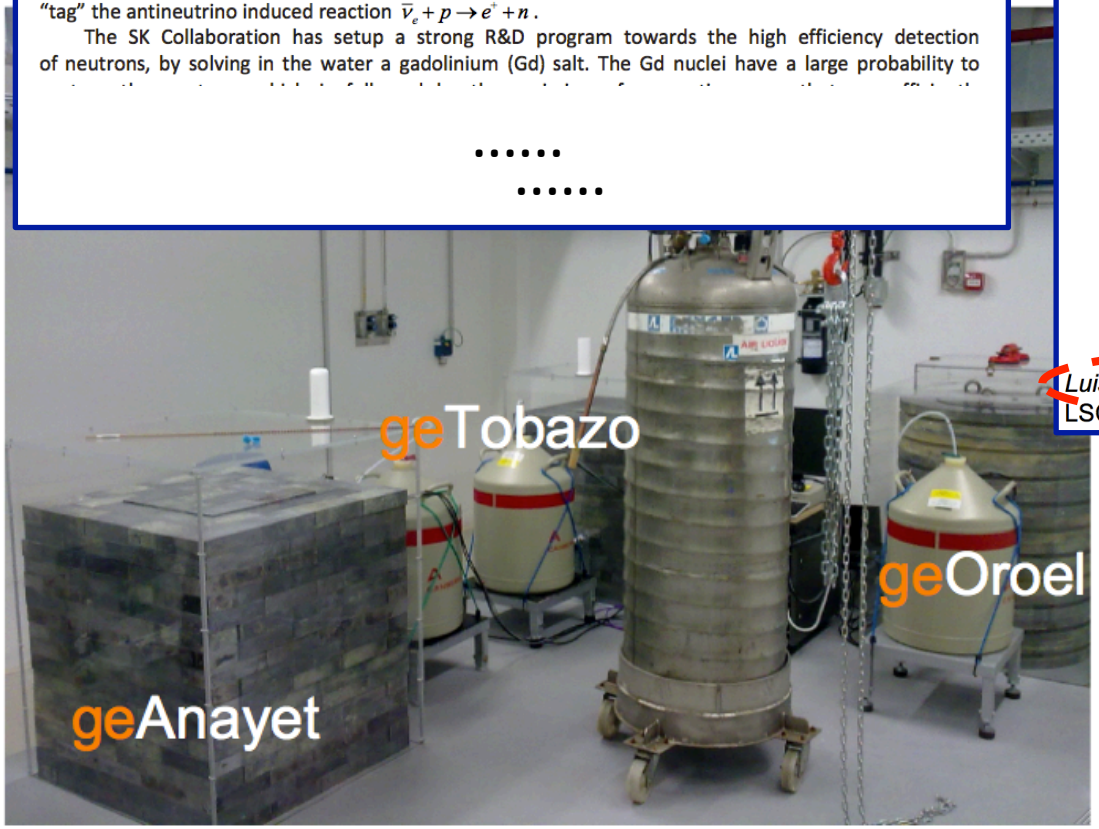
EXP06-2009 SUPERKGD

Very low background measurements for the Super-Kamiokande R&D program on neutron tagging by dissolving Gadolinium in its water

done / to-do
in the half-a-year period
previous / next

Luis Labarga, University Autónoma Madrid

LSC Scientific Committee, Canfranc, November 28th , 2013

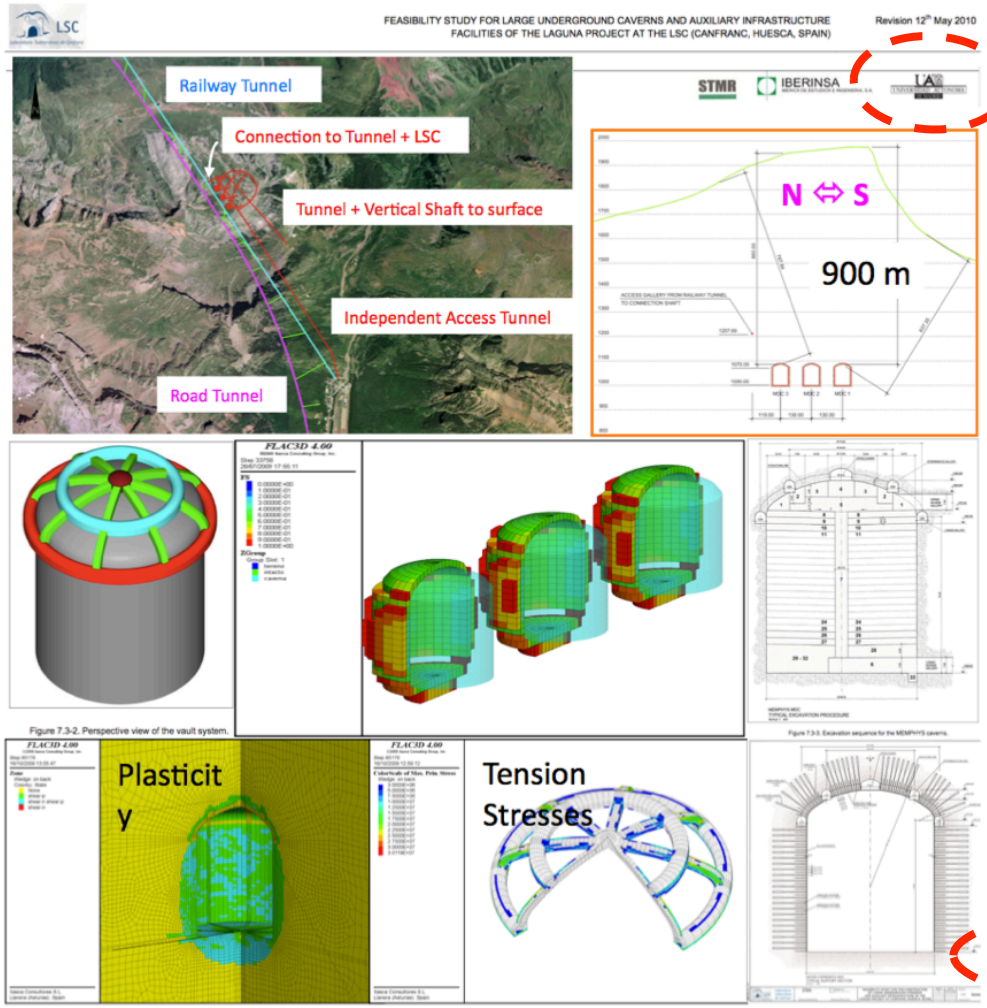


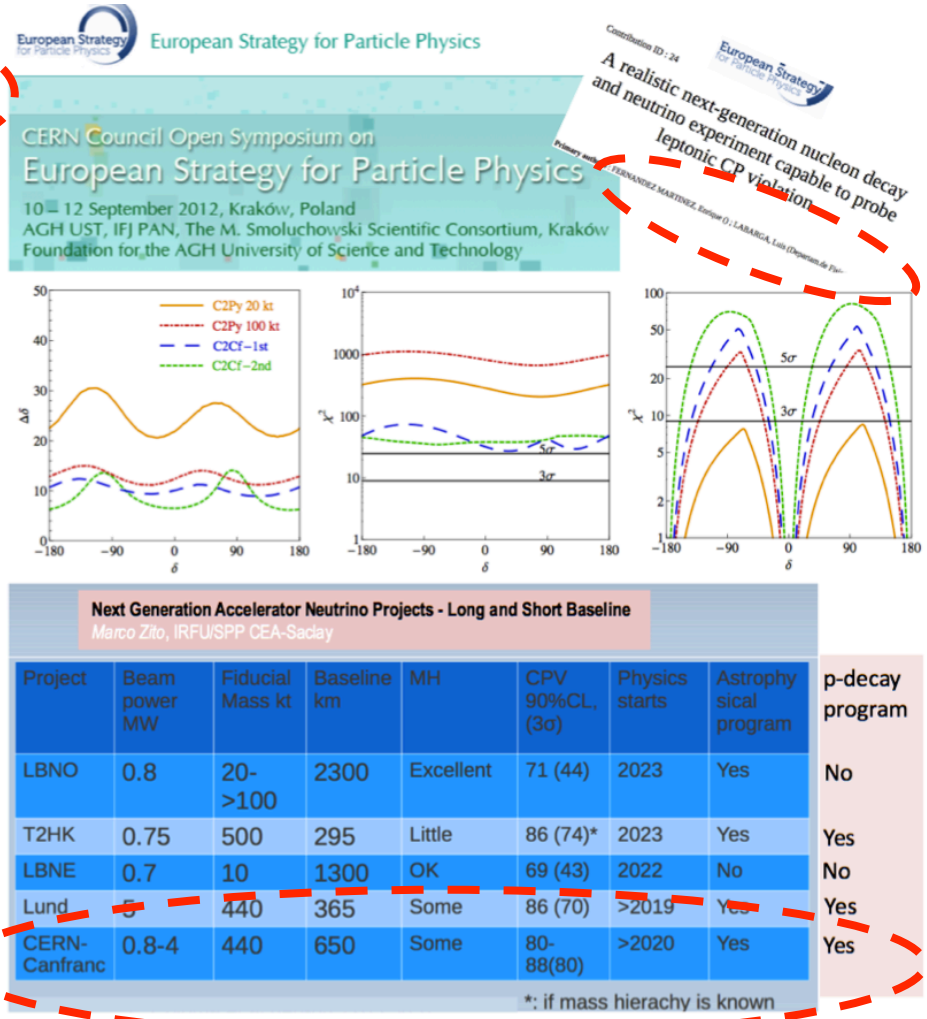
the project is also a (necessary) step towards our desirable near future involvement in the T2K oscillation experiment

- octant of θ_{23}
- neutrino Mass Hierarchy (MH),
- neutrino CP Violation,

and .....

… and a necessary learning step within our work program on the Physics and R&D of the Next generation, megaton scale, Neutrino and Nucleon decay experiment





Project	Beam power MW	Fiducial Mass kt	Baseline km	MH	CPV 90%CL, (3σ)	Physics starts	Astrophysical program	p-decay program
LBNO	0.8	20->100	2300	Excellent	71 (44)	2023	Yes	No
T2HK	0.75	500	295	Little	86 (74)*	2023	Yes	Yes
LBNE	0.7	10	1300	OK	69 (43)	2022	No	No
Lund	5	440	365	Some	86 (70)	>2019	Yes	Yes
CERN-Canfranc	0.8-4	440	650	Some	80-88(80)	>2020	Yes	Yes

as we want to really do it, go to Japan

more contributions on NNN:

Published for SISSA by Springer
Received: June 12, 2012
Revised: September 10, 2012
Accepted: October 18, 2012
Published: November 13, 2012

Physics reach of CERN-based SuperBeam neutrino oscillation experiments

Pilar Coloma,[a] **Enrique Fernández-Martínez**[b] **and Luis Labarga**[c]

[a] *Center for Neutrino Physics, Department of Physics, Virginia Tech, Blacksburg, VA 24061, U.S.A.*
[b] *CERN Physics Department, Theory Division, CH-1211 Geneva 23, Switzerland*
[c] *Departamento de Física Teórica, Universidad Autónoma de Madrid, Cantoblanco 28049 Madrid, Spain*

E-mail: pcoloma@vt.edu, enfmarti@cern.ch, luis.labarga@uam.es

Abstract: We compare the physics potential of two representative options for a Super-Beam in Europe, studying the achievable precision at 1σ with which the CP violation phase

JHEP11(2012)06

Luis Labarga, University Autonoma Madrid
Open Meeting for the Hyper-Kamiokande Project
Kavli IPMU, Kashiwa, 20120822

The **Laguna feasibility study** for the **Canfranc Underground Laboratory [LSC]** to host a **next-generation** mega-ton type **nucleon decay** and **neutrino experiment**

- the context of this talk & brief introduction to LAGUNA
- feasibility study for LAGUNA –WC at the LSC
  - general considerations, geology, etc.
  - cavity support's conceptual design, basic gral. estimates, etc.
  - realistic calculations, design of main cavern, etc.
- cost and time estimates
- summary

A Perspective on Neutrino Physics
By Members of the Spanish Neutrino Physics Community
November 26th, 2012

L. Álvarez-Ruso[a], J.E. Amaro[f], G. Barenboim,[a], J. Bernabeu[a], A. Bettini[g], J.A. Caballero[i], A. Cervera[a], A. De Rújula[b,c], J. Díaz[a], A. Donini[a,b,c], E. Fernández-Martínez[b,c1], M.B.Gavela[b,c], J.J. Gómez-Cadenas[a], J.C. González-García[d,e], J.J. Hernández[a], P. Hernández[a1], J. Hernando[h], R. Jiménez[e], L. Labarga[b], M. Maltoni[b,c], O. Mena[a], J.Miralda-Escudé[e], J. Nieves[a], C. Peña-Garay[a], A. Reyes[b,c], N. Rius[a], M. Sorel[a], L. Verde[e], M. Vicente-Vacas[a], J. Zuñiga[a]

[a] *Instituto de Física Corpuscular, CSIC, Universitat de Valencia*
[b] *Dpto. Física Teórica, Universidad Autónoma de Madrid*
Instituto de Física Teórica, UAM/CSIC
[d] *ICREA, Department d'Estructura i Constituents de la Matèria, Universitat de Barcelona*
[e] *ICREA, Institut de Ciencies del Cosmos, Universitat de Barcelona*
[f] *Dpto. de Física Atómica, Molecular y Nuclear e Instituto Carlos I de Física Teórica y Computacional, Universidad de Granada*
[g] *Laboratorio Subterraneo de Canfranc*
[h] *Instituto Galego de Física de Altas Enerxías, Universidad Santiago de Compostela*
[i] *Departamento de Física Atómica, Molecular y Nuclear, Universidad de Sevilla*

Hyper-Kamiokande Physics Opportunities

Submitted by the Hyper-Kamiokande Working Group * to the 2013 Snowmass Process

August 31st 2013

Abstract

We propose the Hyper-Kamiokande (Hyper-K) detector as a next generation underground water Cherenkov detector [I]. It will serve as a far detector of a long baseline neutrino oscillation experiment envisioned for the upgraded J-PARC beam, and as a detector capable of observing, far beyond the sensitivity of the Super-Kamiokande (Super-K) detector, proton decays, atmospheric neutrinos, and neutrinos from astrophysical origins. The current baseline design of Hyper-K is based on the highly successful Super-K detector, taking full advantage of a well-proven technology. Hyper-K consists of two cylindrical tanks lying side-by-side, the outer dimensions of each tank being $48(W) \times 54(H) \times 250(L)$ m^3. The total (fiducial) mass of the detector is 0.99 (0.56) million metric tons, which is about 20 (25) times larger than that of Super-K. A proposed location for Hyper-K is about 8 km south of Super-K (and 295 km away from J-PARC) at an underground depth of 1,750 meters water equivalent (m.w.e.). The inner detector region of the Hyper-K detector is viewed by 99,000 20-inch PMTs, corresponding to the PMT density of 20% photo-cathode coverage (one half of that of Super-K).

The Hyper-K project is envisioned to be completely open to the international community. The current working group contains members from Canada, Japan, Korea, Spain, Switzerland, Russia, the United Kingdom and the United States. The United States physics community has a long history of making contributions to the neutrino physics program in Japan. In Kamiokande, Super-Kamiokande, K2K and T2K, US physicists have played important roles building and operating beams, near detectors, and large underground water Cherenkov detectors. This set of three one-page whitepapers prepared for the US Snowmass process describes the opportunities for future physics discoveries at the Hyper-K facility with beam, atmospheric and astrophysical neutrinos.

*Project contact: Tsuyoshi Nakaya <t.nakaya@scphys.kyoto-u.ac.jp>

The Hyper-Kamiokande Working Group

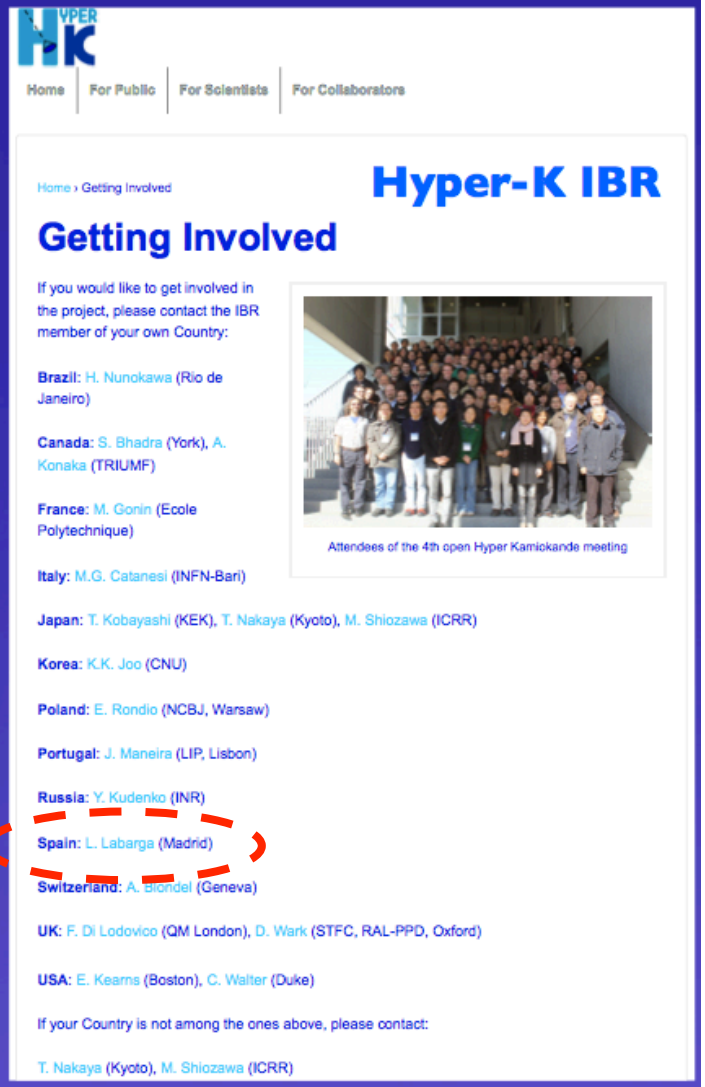
Boston University (USA): E. Kearns, J.L. Stone
Chonnam National University (Korea): K.K. Joo
Duke University (USA): T. Akiri, A. Himmel, K. Scholberg, C.W. Walter
Earthquake Research Institute, The University of Tokyo (Japan): A. Taketa, H.K.M. Tanaka
ETH Zurich (Switzerland): A. Rubbia
Institute for Nuclear Research (Russia): A. Izmaylov, M. Khabibullin, Y. Kudenko
Imperial College London (UK): M. Malek, Y. Uchida, M.O. Wascko
Iowa State University (USA): I. Anghel, G. Davies, M.C. Sanchez, T. Xin
Kamioka Observatory, ICRR, The University of Tokyo (Japan): K. Abe, Y. Haga, Y. Hayato, J. Kameda, Y. Kishimoto, M. Miura, S. Moriyama, M. Nakahata, S. Nakayama, H. Sekiya, M. Shiozawa, Y. Suzuki, A. Takeda, H. Tanaka, T. Tomura, R. Wendell
Kavli IPMU, The University of Tokyo (Japan): M. Hartz, L. Marti, K.Nakamura, M.R. Vagins
KEK (Japan): M. Friend, T. Ishida, T. Kobayashi, Y. Oyama
Kobe University (Japan): A. T. Suzuki, Y. Takeuchi
Kyoto University (Japan): S. Hirota, K. Huang, A. K. Ichikawa, M. Ikeda, A. Minamino, T. Nakaya, K. Tateishi
Lancaster University (UK): A. Finch, L.L. Kormos, J. Nowak, H.M. O'Keeffe, P.N. Ratoff
Los Alamos National Laboratory (USA): G. Sinnis
Louisiana State University (USA): F.d.M. Blaszczyk, J. Insler, T. Kutter, O. Perevozchikov, M. Tzanov
Miyagi University of Education (Japan): Y.Fukuda
Nagoya University (Japan): K.Choi, T. Iijima, Y. Itow
Okayama University (Japan): H. Ishino, Y. Koshio, T. Mori, M. Sakuda, T. Yano
Osaka City University (Japan): Y. Seiya, K. Yamamoto
Pontifícia Universidade Católica do Rio de Janeiro (Brazil): H. Minakata, H. Nunokawa
Queen Mary, University of London (UK): F. Di Lodovico, T. Katori, R. Sacco, B. Still, R. Terri, J.R. Wilson
Seoul National University (Korea): S. B. Kim
State University of New York at Stony Brook (USA): J. Adam, J. Imber, C. K. Jung, C. McGrew, J.L. Palomino, C. Yanagisawa
STFC Rutherford Appleton Laboratory (UK): D. Wark, A. Weber
Sungkyunkwan University (Korea): C. Rott
The California State University Dominguez Hills (USA): K. Ganezer, B. Hartfiel, J. Hill
The University of Tokyo (Japan): H. Aihara, Y. Suda, M. Yokoyama
Tohoku University (Japan): K. Inoue, M. Koga, I. Shimizu
Research Center for Cosmic Neutrinos, ICRR, The University of Tokyo (Japan): T. Irvine, T. Kajita, I. Kametani, Y. Nishimura, K. Okumura, E. Richard
Tokyo Institute of Technology (Japan): M. Ishitsuka, M. Kuze, Y. Okajima
TRIUMF (Canada): P. Gumplinger, A. Konaka, T. Lindner, K. Mahn, J.-M. Poutissou, F. Retiere, M. Scott, M.J. Wilking
University Autonoma Madrid (Spain): L. Labarga
University of British Columbia (Canada): S.M. Oser, H.A. Tanaka
University of Geneva (Switzerland): A. Blondel, A. Bravar, F. Dufour, Y. Karadhzov, A. Korzenev, E. Noah, M. Ravonel, M. Rayner, R. Asfandiyarov, A. Haesler, C. Martin, E. Scantamburlo
University of Hawaii (USA): J.G. Learned
University of Regina (Canada): M. Barbi
University of Toronto (Canada): J.F. Martin
University of California, Davis (USA): M. Askins, M.Bergevin, R. Svoboda
University of California, Irvine (USA): G. Carminati, S. Horiuchi, W.R. Kropp, S. Mine, M.B. Smy, H.W. Sobel
University of Liverpool (UK): N. McCauley, C. Touramanis
University of Oxford (UK): G. Barr, D. Wark, A. Weber
University of Pittsburgh (USA): V. Paolone
University of Sheffield (UK): J.D. Perkin, L.F. Thompson
University of Washington (USA): J. Detwiler, N. Tolich, R. J. Wilkes
University of Warwick (UK): G.J. Barker, S. Boyd, D.R. Hadley, M.D. Haigh
University of Winnipeg (Canada): B. Jamieson
Virginia Tech (USA): S. M. Manecki, C. Mariani, S. D. Rountree, R. B. Vogelaar
York University (Canada): S. Bhadra

as we want to really do it, go to Japan

Hyper-Kamiokande Status

T. Nakaya (Kyoto) @CERN SPC
March 18, 2014

- ~2013
  - HEP and CRC communities endorse Hyper-K.
  - Budget for Hyper-K R&D is available.
    - building One kton proto-type detector.
- 2014
  - IBR (International Board of Representative) committee is formed.
    - Brazil, Canada, France, Italy, Japan, Korea, Poland, Portugal, Russia, Spain, Switzerland, UK, and US.
  - Science Council of Japan announced "Japanese Master Plan of Large Research Projects". New
    - http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-22-t188-1.pdf
    - Top 27 projects out of 192 are selected in all science area. The Hyper-K is one of the top projects to be pursued in Japan.



Home | For Public | For Scientists | For Collaborators

Home › Getting Involved

Hyper-K IBR

Getting Involved

If you would like to get involved in the project, please contact the IBR member of your own Country:

Attendees of the 4th open Hyper Kamiokande meeting

Brazil: H. Nunokawa (Rio de Janeiro)

Canada: S. Bhadra (York), A. Konaka (TRIUMF)

France: M. Gonin (Ecole Polytechnique)

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, Lisbon)

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)

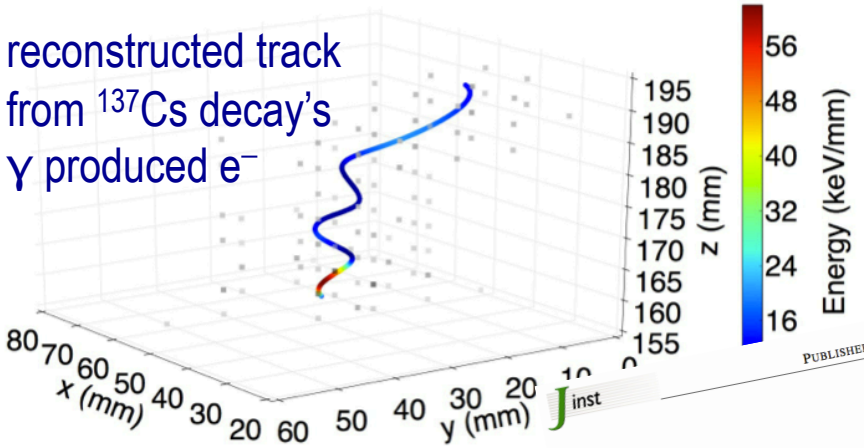
If your Country is not among the ones above, please contact:

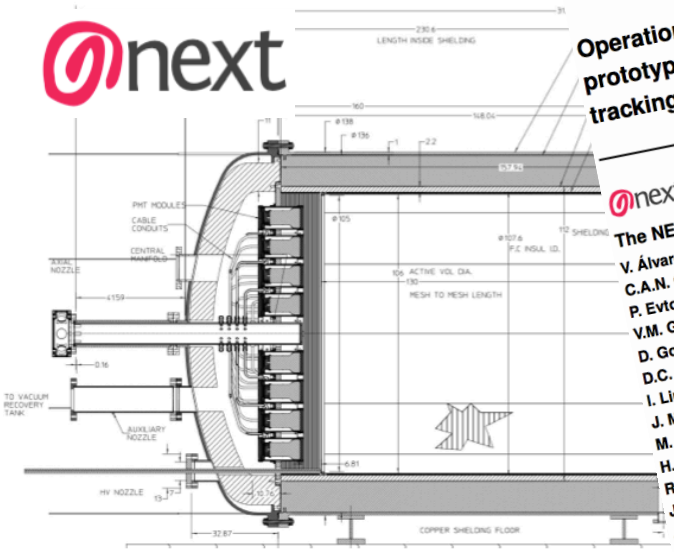
T. Nakaya (Kyoto), M. Shiozawa (ICRR)

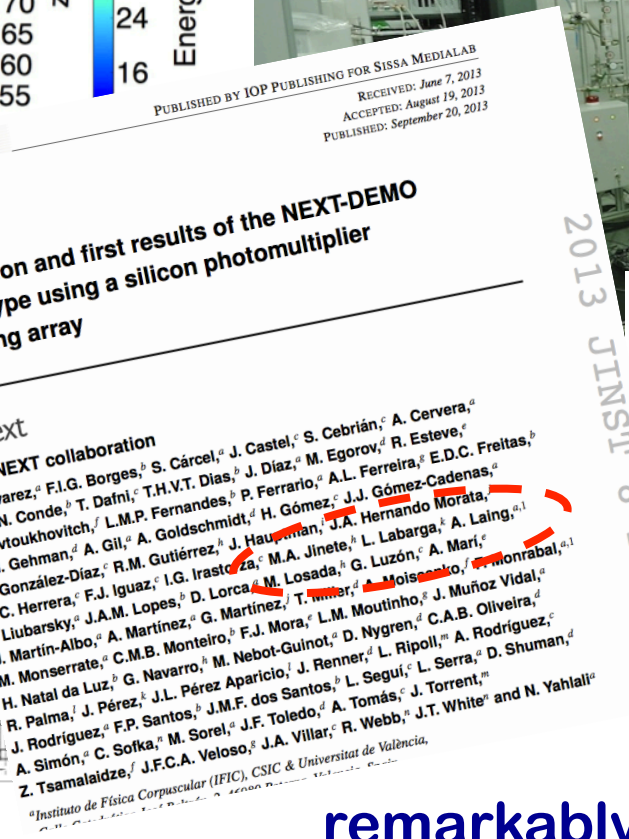
further,

the similarity of some of its physics and instrumental activities allows to participate actively in the search for $\beta\beta0\nu$ with NEXT at the LSC (Canfranc Underground Laboratory)

reconstructed track
from ^{137}Cs decay's
γ produced e^-







Published by IOP Publishing for Sissa Medialab
Received: June 7, 2013
Accepted: August 19, 2013
Published: September 20, 2013

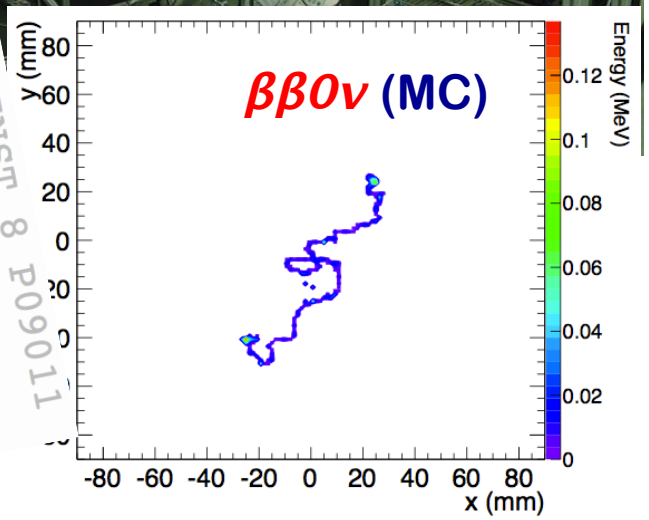
2013 JINST 8 P09011

Operation and first results of the NEXT-DEMO prototype using a silicon photomultiplier tracking array

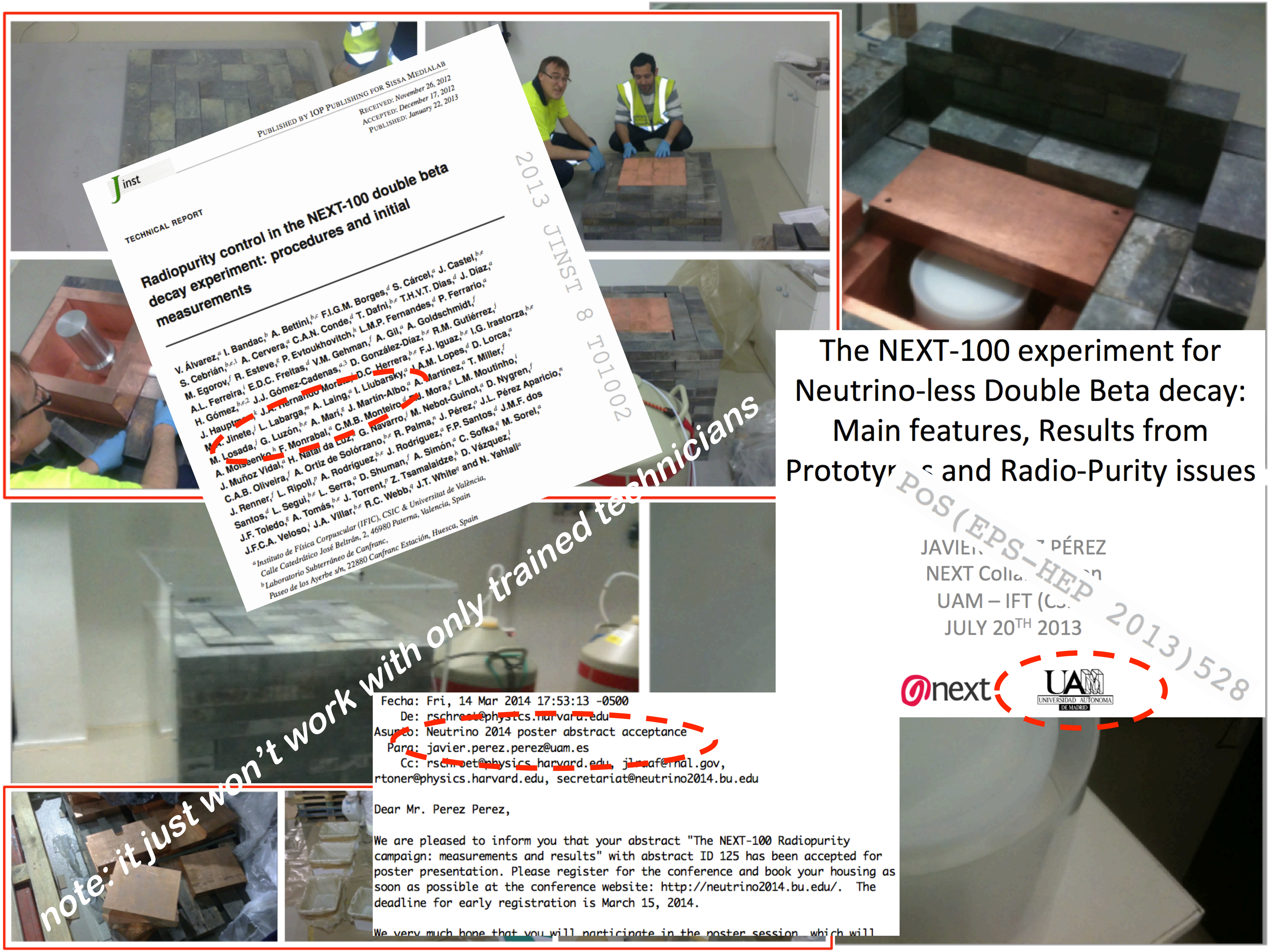
The NEXT collaboration

V. Álvarez,[a] F.I.G. Borges,[b] S. Cárcel,[a] J. Castel,[c] S. Cebrián,[c] A. Cervera,[a] C.A.N. Conde,[b] T. Dafni,[c] T.H.V.T. Dias,[b] J. Díaz,[a] M. Egorov,[d] R. Esteve,[e] P. Evtoukhovitch,[f] L.M.P. Fernandes,[b] P. Ferrario,[a] A.L. Ferreira,[g] E.D.C. Freitas,[b] V.M. Gehman,[d] A. Gil,[a] A. Goldschmidt,[d] H. Gómez,[c] J.J. Gómez-Cadenas,[a] D. González-Díaz,[c] R.M. Gutiérrez,[h] J. Hauptman,[i] J.A. Hernando Morata,[a] D.C. Herrera,[c] F.J. Iguaz,[c] I.G. Irastorza,[c] M.A. Jinete,[h] L. Labarga,[k] A. Laing,[a,1] I. Liubarsky,[a] J.A.M. Lopes,[b] D. Lorca,[a] M. Losada,[h] G. Luzón,[c] A. Marí,[e] J. Martín-Albo,[a] A. Martínez,[a] G. Martínez,[j] T. Miller,[d] A. Moiseenko,[f] F. Monrabal,[a,1] M. Monserrate,[a] C.M.B. Monteiro,[b] F.J. Mora,[c] L.M. Moutinho,[g] J. Muñoz Vidal,[a] H. Natal da Luz,[b] G. Navarro,[h] M. Nebot-Guinot,[a] D. Nygren,[d] C.A.B. Oliveira,[d] R. Palma,[l] J. Pérez,[k] J.L. Pérez Aparicio,[l] J. Renner,[d] L. Ripoll,[m] A. Rodríguez,[c] J. Rodríguez,[a] F.P. Santos,[b] J.M.F. dos Santos,[b] L. Seguí,[c] L. Serra,[a] D. Shuman,[d] A. Simón,[a] C. Sofka,[n] M. Sorel,[a] J.F. Toledo,[d] A. Tomás,[c] J. Torrent,[m] J.F.C.A. Veloso,[g] J.A. Villar,[c] R. Webb,[n] J.T. White[n] and N. Yahlali[a]

[a]Instituto de Física Corpuscular (IFIC), CSIC & Universitat de València,



remarkably, *radio-purity ...*


PUBLISHED BY IOP PUBLISHING FOR SISSA MEDIALAB
RECEIVED: November 26, 2012
ACCEPTED: December 17, 2012
PUBLISHED: January 22, 2013
Jinst
TECHNICAL REPORT
Radiopurity control in the NEXT-100 double beta decay experiment: procedures and initial measurements
V. Álvarez,[a] I. Bandac,[b] A. Bettini,[b,c] F.I.G.M. Borges,[d] S. Cárcel,[a] J. Castel,[b,e] S. Cebrián,[b,e,1] A. Cervera,[a] C.A.N. Conde,[d] T. Dafni,[b,e] T.H.V.T. Dias,[d] J. Díaz,[a] M. Egorov,[f] R. Esteve,[g] P. Evtoukhovitch,[h] L.M.P. Fernandes,[d] P. Ferrario,[a] A.L. Ferreira,[i] E.D.C. Freitas,[d] V.M. Gehman,[f] A. Gil,[a] A. Goldschmidt,[f] H. Gómez,[b,e,2] J.J. Gómez-Cadenas,[a,3] D. González-Díaz,[b,e] R.M. Gutiérrez,[j] J. Hauptman,[k] J.A. Hernando Morata,[l] D.C. Herrera,[b,e] F.J. Iguaz,[b,e] I.G. Irastorza,[b,e] M.A. Jinete,[j] L. Labarga,[m] A. Laing,[a] I. Liubarsky,[a] J.A.M. Lopes,[d] D. Lorca,[a] M. Losada,[j] G. Luzón,[b,e] A. Marí,[g] J. Martín-Albo,[a] A. Martínez,[a] T. Miller,[f] A. Moiseenko,[h] F. Monrabal,[a] C.M.B. Monteiro,[d] F.J. Mora,[g] L.M. Moutinho,[i] J. Muñoz Vidal,[a] H. Natal da Luz,[d] G. Navarro,[j] M. Nebot-Guinot,[a] D. Nygren,[f] C.A.B. Oliveira,[f] A. Ortiz de Solórzano,[b,e] R. Palma,[n] J. Pérez,[o] J.L. Pérez Aparicio,[n] J. Renner,[f] L. Ripoll,[p] A. Rodríguez,[b,e] J. Rodríguez,[a] F.P. Santos,[d] J.M.F. dos Santos,[d] L. Segui,[b,e] L. Serra,[a] D. Shuman,[f] A. Simón,[a] C. Sofka,[q] M. Sorel,[a] J.F. Toledo,[g] A. Tomás,[b,e] J. Torrent,[p] Z. Tsamalaidze,[h] D. Vázquez,[l] J.F.C.A. Veloso,[i] J.A. Villar,[b,e] R.C. Webb,[q] J.T. White[q] and N. Yahlali[a]
[a] Instituto de Física Corpuscular (IFIC), CSIC & Universitat de València, Calle Catedrático José Beltrán, 2, 46980 Paterna, Valencia, Spain
[b] Laboratorio Subterráneo de Canfranc, Paseo de los Ayerbe s/n, 22880 Canfranc Estación, Huesca, Spain
2013 JINST 8 T01002
note: it just won't work with only trained technicians
The NEXT-100 experiment for Neutrino-less Double Beta decay: Main features, Results from Prototypes and Radio-Purity issues
JAVIER PÉREZ PÉREZ
NEXT Collaboration
UAM – IFT (CSIC)
JULY 20TH 2013
PoS(EPS-HEP 2013)528
next
UAM UNIVERSIDAD AUTONOMA DE MADRID
Fecha: Fri, 14 Mar 2014 17:53:13 -0500
De: rschroet@physics.harvard.edu
Asunto: Neutrino 2014 poster abstract acceptance
Para: javier.perez.perez@uam.es
Cc: rschroet@physics.harvard.edu, jlraaf@fnal.gov, rtoner@physics.harvard.edu, secretariat@neutrino2014.bu.edu
Dear Mr. Perez Perez,
We are pleased to inform you that your abstract "The NEXT-100 Radiopurity campaign: measurements and results" with abstract ID 125 has been accepted for poster presentation. Please register for the conference and book your housing as soon as possible at the conference website: http://neutrino2014.bu.edu/. The deadline for early registration is March 15, 2014.
We very much hope that you will participate in the poster session, which will

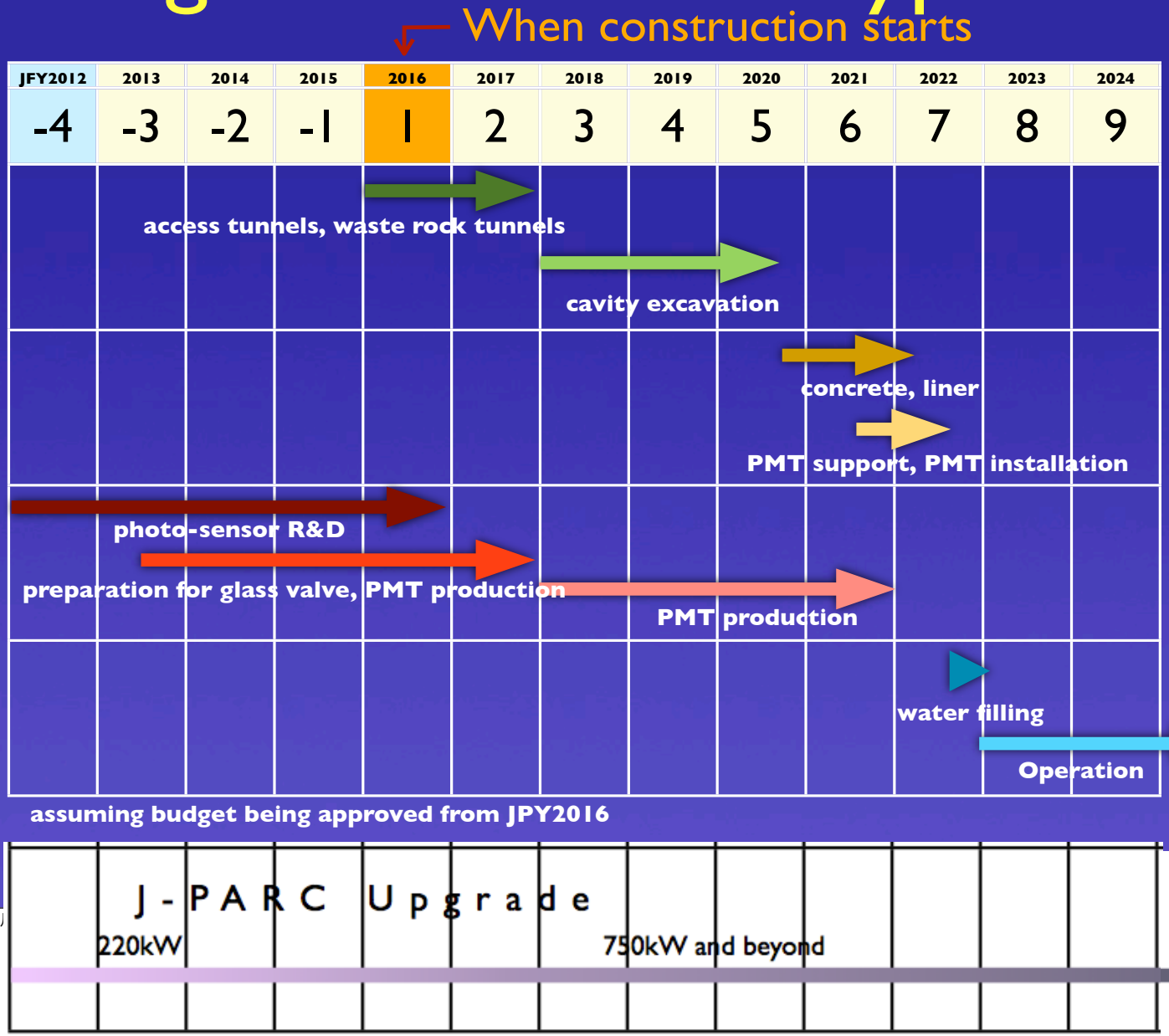
EGADS time-line

2012 – 2013		200-ton Tank Gd run
	2013	PMT installation
2013 – 2014		200-ton Tank pure water data taking
	2014	200-ton Tank Gd data taking ← *we are here*
2014	→	thorough analysis of performance, feasibility etc.
	2014	electronics upgrade
2014	→	nearby Galactic Supernova Sensitivity

the precise schedule for *GADZOOKS!*,
i.e. for running SK with Gd, must still
be discussed and agreed upon within
the Super-Kamiokande Collaboration

T. Nakaya (Kyoto) @CERN SPC March 18, 2014

Target Schedule of Hyper-K



14年3月17日

Related to **scientific policy and scientific relations**, our works on ***SK*** and on *radioactive contaminations* in GADZOOKS!, are increasing the visibility of the UAM and LSC in the Kamioka Observatory (+ other important Institutes as Boston U., U.C. Irvine, Kavli-IPMU and ICRR), and their consideration for future common scientific enterprises

an example is the nowadays permanent presence of one relevant member of the Kamioka Observatory in the LSC's Scientific Committee.

LSC-SUMSC 5/09

SUMMARY AND CONCLUSIONS

5th Meeting of the LSC Scientific Committee

October 22-23, 2009

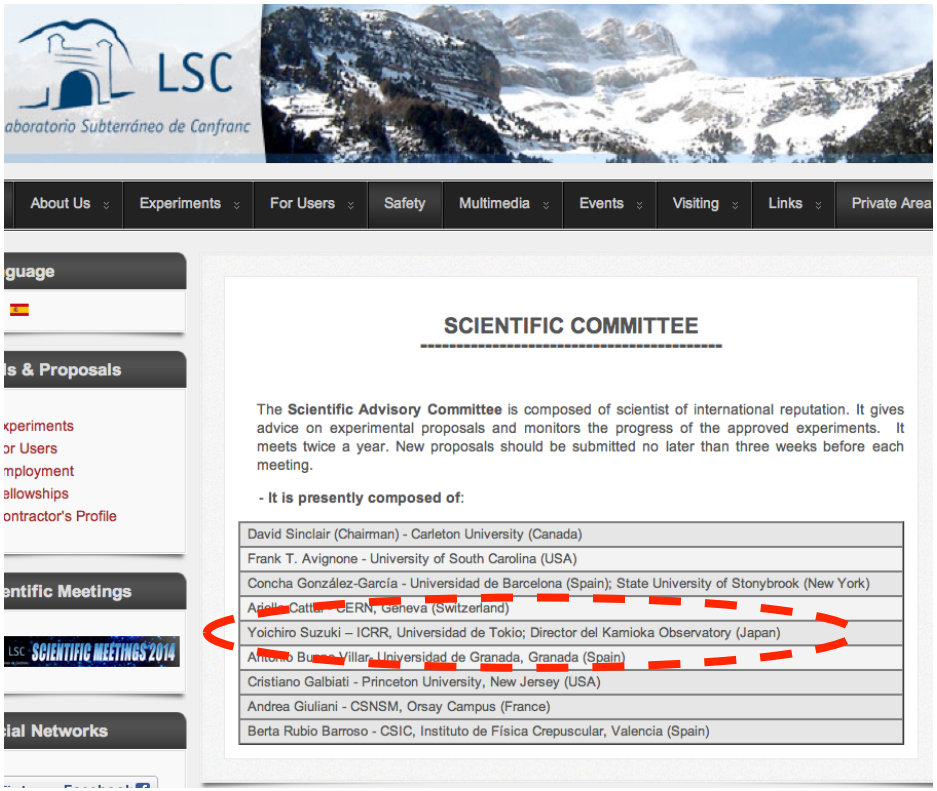
The meeting was convened at 09:00 Thursday, 22 October, 2009 in Canfranc. Present were: Elena Aprile, Frank Avignone (Chair), Alessandro Bettini (Laboratory Director), Juan Fuster, Belen Gavela, Chang-Kee Jung, Masayuki Nakahata, and José Angel Villar. Laura Baudis joined the meeting via Skype. Andres Gadea had justified his absence.

We were honored to be joined for part of the day by Joaquin Serrano Agejas and Angela Fernandez of the Ministerio de Ciencia e Innovacion, and Jose Luis Serrano of the Government of Aragon.

The Committee held a closed session from 09:00 to 09:30 to discuss the status

.....

.....



remarkable is the

"Agreement on Academic Cooperation between the Autonomous University of Madrid and the Institute for Cosmic Ray Research, the University of Tokyo"

promoted by us, formally signed one year ago

AGREEMENT ON ACADEMIC COOPERATION
BETWEEN
THE FACULTY OF SCIENCES, AUTONOMOUS UNIVERSITY OF MADRID
AND
THE INSTITUTE FOR COSMIC RAY RESEARCH, THE UNIVERSITY OF TOKYO

The Faculty of Sciences, Autonomous University of Madrid (Spain) and the Institute for Cosmic Ray Research, The University of Tokyo (Japan), hereinafter referred to as the "parties", in the firm conviction that academic cooperation between the parties will promote academic research and other activities, hereby conclude the following Agreement.

Article 1. The parties agree to promote cooperation between both organizations in research and academic fields of mutual interest through appropriate means as follows:

1. Exchanging research staff,
2. Exchanging students,
3. Conducting joint research,
4. Arranging joint meeting and symposia, and
5. Exchanging information and academic publications.

Article 2. The parties shall prepare a research plan concerning specific and concrete steps and measures for implementing Article 1, and shall honor the principle of reciprocity in implementing such program.

Article 3. The parties shall make every effort to raise funds from various sources to realize cooperative programs. Any program prepared under Article 2 shall be implemented only after appropriate funds have been acquired.

Article 4. This Agreement is valid for five (5) years effective from the date of the final signature affixed below by the parties hereto. The term of the Agreement may be extended upon agreement by the parties.

Article 5. This Agreement may be amended by agreement of the parties. Either party may terminate this Agreement by serving a six-month prior written notice to the other party. Such termination will not affect the validity and continuity of any incompletely discharged obligation agreed upon by the two parties before termination.

In witness of the above, this Agreement is to be executed in two identical copies in three languages: Japanese, Spanish, and English, by authorized representatives of each party, and the parties shall retain one copies of the Agreement in each language.

Isabel Castro Parga
Dean of The Faculty of Sciences
Autonomous University of Madrid

M. Asunción Martínez Cebrián
Vice-rector for International Relations
By delegation of the Rector [Resolution of February 10th 2012, B.O.C.M. February 20th]
Autonomous University of Madrid

Date Jan 8, 2013

T. Kajita

Takaaki Kajita
Director
Institute for Cosmic Ray Research
The University of Tokyo

Date Nov. 19, 2012

1298

ACUERDO DE COOPERACIÓN ACADÉMICA
ENTRE
LA FACULTAD DE CIENCIAS, UNIVERSIDAD AUTÓNOMA DE MADRID
Y
EL INSTITUTO PARA LA INVESTIGACIÓN EN RAYOS CÓSMICOS, UNIVERSIDAD DE TOKIO

La Facultad de Ciencias de la Universidad Autónoma de Madrid (España) y el Instituto para la Investigación en Rayos Cósmicos de la Universidad de Tokio (Japón), en lo que sigue referidos como "las partes", en la firme convicción de que la cooperación académica entre las partes promoverá la investigación así como otras actividades, concluyen aquí el siguiente Acuerdo:

Artículo 1. Las partes acuerdan el promover la cooperación entre ambas organizaciones en aquellos campos académicos y de investigación de interés mutuo mediante medios apropiados como sigue:

1. Intercambio de personal investigador
2. Intercambio de estudiantes
3. Realización conjunta de proyectos de investigación
4. Organización conjunta de reuniones y simposios
   Intercambio de información y publicaciones académicas

Artículo 2. Las partes prepararán una planificación de investigación en lo que concierne a los pasos y medidas, concretos y específicos, para la implementación del Artículo 1, y deberán cumplir el principio de reciprocidad en la implementación de dicho programa.

Artículo 3. Las partes harán todos los esfuerzos necesarios para obtener fondos de diversas fuentes para la realización de sus programas de cooperación. Cualquier programa preparado bajo el Artículo 1 sólo se implementará un vez conseguida la financiación apropiada.

Artículo 4. Este Acuerdo es válido durante cinco (5) años efectivos a partir de la fecha de la última firma, pudiendo ser renovado por acuerdo expreso de las partes.

Artículo 5. Este Acuerdo puede ser modificado por acuerdo expreso de las partes. Cada parte podrá terminar este Acuerdo comunicándolo a la otra parte con seis meses de antelación. Esta terminación no afectará la validez y continuidad de cualquier obligación no finalizada que hubiera sido acordada por las partes antes de la terminación.

En confirmación de lo anterior, este Acuerdo es ejecutado en dos copias idénticas en tres idiomas: japonés, español e inglés, por los representantes autorizados de cada parte, y la partes retendrán una copia del Acuerdo en cada idioma.

Isabel Castro Parga
Decana de la Facultad de Ciencias
Universidad Autónoma de Madrid

M. Asunción Martínez Cebrián
Vicerrectora de Relaciones Internacionales
Por delegación del Rector [Resolución de 10 de febrero de 2012, B.O.C.M. de 20 de febrero]
Universidad Autónoma de Madrid

Fecha Jan 8, 2013

T. Kajita

Takaaki Kajita
Director
Institute for Cosmic Ray Research
The University of Tokyo

Date Nov. 19, 2012

東京大学宇宙線研究所と
マドリッド自治大学理学部
との間における
学術交流に関する協定書

東京大学宇宙線研究所（日本国）とマドリッド自治大学理学部（スペイン）（以下「当事者」という）は、当事者の間における学術交流が、当事者の学術研究及びその他の活動を促進させることを確信し、以下のとおり協定を締結する。

第１条　当事者は、以下の如き適切な手段により、相互に興味のある研究、学術分野における協力を促進することに合意する。

１．研究者の交流
２．学生の交流
３．共同研究の遂行
４．シンポジウム及び研究集会の開催
５．研究情報及び学術出版物の交換

第２条　当事者は、第１条を履行する為の具体的かつ詳細な研究計画を立案する。研究遂行にあたっては互恵主義の原則を尊重するものとする。

第３条　当事者は、共同研究遂行に必要な資金を得る為、最善の努力をするものとする。第２条に基づくいかなる研究計画も、その研究を実施するための資金が得られた後、効力を持つものとする。

第４条　この協定は、当事者による下記の署名日の遅い方の日より５年間（以下「有効期間」という）有効とする。有効期間は当事者の合意で延長することができる。

第５条　この協定は、当事者の合意により改訂し得るものとする。有効期間内といえども、各当事者は６ヶ月前に通知することによりこの協定を解除することができる。なお、その場合でも解除前に当事者で合意した責務の妥当性、継続性を妨げることはない。

両当事者の代表者は、この合意の証として、この協定書を日本語、スペイン語、および英語で各２部作成し、双方で１部ずつを保管するものとする。

梶田隆章
東京大学宇宙線研究所　所長
梶田　隆章

Date 2012年 11月 19日

Isabel Castro Parga
Dean of The Faculty of Sciences
Autonomous University of Madrid

M. Asunción Martínez Cebrián
Vice-rector for International Relations
By delegation of the Rector [Resolution of February 10th 2012, B.O.C.M. February 20th]
Autonomous University of Madrid

Date Jan 8, 2013

Final slide (I)

the project seeks some peace at continuing and expanding our full involvement in an experimental program that is currently tackling truly fundamental problems in Basic Science, remarkably,

- solar ν flux, matter effects in ν oscillations ..
- precise measurement of leptonic mixing matrix elements
- neutrino Mass Hierarchy (MH),
- neutrino CP Violation,
- Dirac or *Majorana* nature of the neutrino,

- Grand Unification Theories; search for Proton Decay,

- Diffuse Supernova Neutrino Background (DSNB); evolution of the Universe, star formation, neutrino interactions
- nearby Galactic Supernova; neutrino physics at very high temperature and density

Final slide (and II)

CONCEPTO		COSTE IMPUTABLE
COSTES DIRECTOS	Gastos de personal	110000.0
	Viajes y dietas	95.600 €
	Otros gastos	40.400 €
	Adquisición de inventariable	8.200 €
	Alquiler de Inventariable	0 €
	Mantenimiento de Inventariable	1.000 €
	Fungible	12.600 €
TOTAL COSTES DIRECTOS		267.800 €

7.1. Gasto Personal

Perfil	Coste imputable	Justificación de necesidad y tareas que realizará
Doctorado	80.000	Contrato PostDoc por dos años (2 x 40.000), cuota patronal incluida. Fundamental para garantizar como mínimo un PostDoc activo en el Proyecto. Estaría basado principalmente en Kamioka. Este PostDoc es una pieza clave para nuestros trabajos relevantes en la instrumentación de EGADS y en los dispositivos de calibración de Super-Kamiokande.
Licenciado, Arquitecto o Ingeniero Superior	15.000	Dinero que permita cubrir los periodos en los que no haya la financiación externa correspondiente. Ejemplos son: el periodo entre la incorporación y concesión de beca oficial los estudiantes de doctorado y el periodo entre dos contratos con financiación externa del Investigador Postdoctoral y/o del Ingeniero o Físico Instrumental. Para la estimación de costes se ha considerado un cuarto de contrato de licenciado anual, cuota patronal incluida, por dos años.
Otros	15.000	Cada vez es más importante el trasladar los resultados científicos al resto de la sociedad. Pero ello requiere mucho tiempo y esfuerzo que, o no tenemos o no queremos "robar" de nuestros trabajos científicos. Una persona con las características especificadas es una excelente solución al problema. Obviamente debería ser un contrato a tiempo parcial. La cantidad solicitada se corresponde a un cuarto de contrato de licenciado anual, cuota patronal incluida, por dos años.

TOTAL	110.000

7.2. Viajes y dietas

Descripción	Coste imputable EURO	Justificación de uso
Viajes y dietas estudiante programa FPU	11.600	POR AÑO: A) Viaje al laboratorio (Kamioka, Japón) y dieta por estancia permanente de 1 mes el primer año y 2 el segundo. 1200 + (1+2)/2 x 1000 = 3700 B) 1 viaje de 10 días a Kamioka (Japón) para calibraciones, toma de datos etc. [1200 viaje + 800 alojamiento y manutención]= 2100. TOTAL DOS AÑOS: 2 x 5800= 11600
Viajes y dietas Postdoc contratado	25.800	POR AÑO: A) dieta por estancia permanente en el laboratorio (Kamioka, Japón) durante 9 meses. 9 x 800 = 7200 B) 3 viajes entre Japon y España para asuntos académicos, discusion resultados, estancia en la UAM. 3 x 1200 = 3600 D) Asistencia a la Conferencia anual relevante al campo (tipo NEUTRINO, TAUP, LeptonPhoton, ICHEP, EPS etc.) y/o Presentacion resultados en "Workshop". 1000 viaje + 300 inscripcion + 800 alojamiento = 2100. TOTAL DOS AÑOS: 2 x 12900
Viajes y dietas IP	36.300	POR AÑO: A) 2 de 10 días a Kamioka (Japón) para asistir a las dos reuniones anuales de la Colaboración y ejecución de calibraciones de duración corta. 2 x [1200 viaje + 800 transporte, alojamiento y manutención] = 4000 B) 2 de 10 días a Kamioka (Japón) correspondientes a dos periodos de toma de datos y otros dos de calibraciones de duración larga. 2 x [1200 viaje + 800 transporte, alojamiento y manutención] = 4000 C) 5 de 2 días al LSC. 5 x 400 = 2000 D) Asistencia a la Conferencia anual relevante al campo (tipo NEUTRINO, TAUP, LeptonPhoton, ICHEP, EPS etc.) y/o presentación resultados en "Workshop" relevante. 1 x [1000 viaje + 300 inscripción + 800 alojamiento] = 2100 TOTAL TRES AÑOS: 3 x 12100
Viajes y estancias de Pablo Fernández Menéndez	21.900	POR AÑO: A) Viaje al laboratorio (Kamioka, Japón) y dieta por estancia permanente de 2 meses 1200 + 2 x 1000 = 3200 B) 1 viajes de 10 días a Kamioka (Japón) para calibraciones, toma de datos etc. 1 x [1200 viaje + 800 alojamiento y manutención]= 2000 C) Asistencia a la Conferencia anual relevante al campo (tipo NEUTRINO, TAUP, LeptonPhoton, ICHEP, EPS etc.) y/o Presentacion resultados en "Workshop" 1000 viaje + 300 inscripcion + 800 alojamiento = 2100. TOTAL TRES AÑOS: 3 x (3200 + 2000 + 2100) = 21900

7.3. Otros Gastos

Descripción	Coste imputable EURO	Justificación de uso
Medidas en el "Laboratorio ICP-MS"	12.000	En condiciones no demasiado desfavorables, con una reproducibilidad razonable de la abundancia relativa de los isotopos del Gd, prevemos unas 10 medidas / año. Similarmente, para la cuantificación de los isótopos radioactivos primordiales. Total 3 x [20 x 20 euros/medida] = 12000
Contingencias	1.700	Se considera apropiado para ellas una cantidad cercana al 10 % del total de los costes de ejecución.
Viajes y dietas Javier Pérez Pérez	26.700	POR AÑO: A) (21+10+5)/3 de 4 días al LSC. 12 x 400 = 4800 B) 1 viaje de 10 días Kamioka (Japón) para toma de datos y calibraciones. [1200 viaje + 800 alojamiento y manutención] = 2000 C) Asistencia a la Conferencia anual relevante al campo (tipo NEUTRINO, TAUP, LeptonPhoton, ICHEP, EPS etc.) y/o Presentacion resultados en "Workshop". Aprox. 1000 viaje + 300 inscripcion + 800 alojamiento = 2100 TOTAL TRES AÑOS: 3 x 8900 = 26700

7.4. Adquisición de inventariable

Descripción	Coste imputable EURO	Justificación de uso
5 x [ordenador portátil MacBookPro 13 pulgadas, Procesador Core i7 de Intel de dos núcleos a 2,9 GHz, Memoria de 8 GB a 1600 MH, Disco duro 1TB ATA a 5.400 rpm, HD Graphics 4000 de Intel, + disco duro externo, Seagate 1Tb backpup plus, USB 3.0]= 5 x [1550 + 90] = 5 x 1640	8.200	Herramienta imprescindible. Cálculos pequeños e intermedios, "Desktop", Correo- e, Internet, Videoconferencia. El disco es para copias de seguridad de frecuencia diaria. La elección de marca y modelo esta basada en la excelente experiencia que el IP y los miembros del equipo de trabajo tienen o han tenido con modelos similares en los últimos años: robustez y facilidad de adaptación a cualquier configuración en cualquier lugar del mundo. Se piden 5 unidades: - 1 para Pablo Fernández Ménendez, cuyo ordenador previo se estropeó fatalmente y que ahora está usando un mini-ordenador (11') que tenemos para la monitorización permanente del sistema en Kamioka que hacemos de forma remota. - 1 para sustituir el ordenador actual de Javier Pérez Pérez, que dada su antigüedad (~5 años) se prevee una avería fatal en el corto plazo. - 1 para postDoc contratado - 1 para estudiante del programa FPI - 1 reserva en caso de fallo de alguna de la unidades mencionadas o la actual del IP

7.5. Mantenimiento de inventariable

Descripción	Coste imputable EURO	Justificación de uso
reparación de equipos informáticos	1.000	Nuestra experiencia previa nos hace prever unos dos fallos del material informático durante el periodo de realización del proyecto, con coste de reparación de unos 500 euros

7.6. Fungible

Descripción	Coste imputable EURO	Justificación de uso
DC power supply - 2000 euros Solenoid control - 1500 euros Magnetometer probes - 1000 euros Probe holders Electronics - 500 euros Magnetometer electronics - 1000 euros DAQ link - 1000 euros Data storage - 500 euros	7.500	Componentes inventariables necesarias para el desarrollo del sistema magnético de medida de la concentración de la sal de Gd en el agua.
material for SQUID sample container - 500 5 units Machining of SQUID container - 1000 Solenoid preparation - 1500	3.000	efectos no inventariables relacionadas con el sistema magnético de medir la concentración de sal de Gd en el agua
Estimación del gasto que haremos en los envios de materiales entre el LSC, Kamioka y la UAM. Se consideran 700 euros año.	2.100	Envio de muestras y pequeño equipo entre institutos involucrados