Stanford

Giorgio Gratta

Ray Lyman Wilbur Professor

Physics

CONTACT INFORMATION

- **Administrative Contact**

  Sha Zhang

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Bio

BIO

Giorgio Gratta is a Professor of Physics at Stanford university where he is currently serving as chair of the Physics Department. Gratta is an experimentalist, with research interests in the broad area of the physics of fundamental particles and their interactions. While his career started with experiments at particle colliders, since at Stanford Gratta has tackled the study of neutrinos and gravity at the shortest distances. With two landmark experiments using neutrinos produced by nuclear reactors, made observations in the area of neutrino oscillations, and with one of them was first in reporting oscillations using artificial neutrinos and establishing the finite nature of neutrino masses. The same experiment was also first to detect neutrinos from the interior of our planet, providing a new tool for the Earth sciences. At a very different energy scale, Gratta and his group substantially advanced the techniques to detect ultra-high energy neutrinos in cosmic radiation, using acoustic signals in large bodies of water.

In more recent times, Gratta has led the development of liquid Xenon detectors in the search for the neutrinoless double beta decay, a nuclear decay that if observed would change our understanding of the quantum nature of neutrinos and help explaining the asymmetry between matter and antimatter in the universe. Gratta is currently the scientific leader of one of the three very large experiments on the subject, world-wide.

In a parallel development, Gratta’s group is studying new long range interactions (or an anomalous behavior of gravity) at distances below 50 micrometers. This is achieved with an array of different techniques, from optical levitation of microscopic particles in vacuum, to the use of Mössbauer spectroscopy and, most recently, neutron scattering on nanostructured materials.

ACADEMIC APPOINTMENTS

- Professor, Physics

LINKS

- Gratta Lab: http://grattalab3.stanford.edu/neutrino/index.html

Teaching

COURSES

2022-23

- Department Colloquium: PHYSICS 302 (Aut)

2021-22

- Quantum and Thermal Physics: PHYSICS 65 (Spr)

2020-21

- Light and Heat: PHYSICS 45 (Aut)
- Quantum and Thermal Physics: PHYSICS 65 (Sum)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Jyotirmai Singh, Rachel Smith, Bahrudin Trbalic

Postdoctoral Faculty Sponsor

Soud Al Kharusi, Evan Angelico, Lorenzo Magrini, Lin Si, Gautam Venugopalan, Marie Vidal, Yuqi Zhu

Doctoral Dissertation Advisor (AC)

Clarke Hardy

Doctoral Dissertation Co-Advisor (AC)

Albert Nazeeri

Postdoctoral Research Mentor

Evan Angelico, Lorenzo Magrini, Gautam Venugopalan, Marie Vidal

Publications

PUBLICATIONS

- **Neutrino physics for Korean diplomacy.** *Science (New York, N.Y.)*
  Carr, R., Coleman, J., Gratta, G., Heeger, K., Huber, P., Hor, Y., Kawasaki, T., Kim, S., Kim, Y., Learned, J., Lindner, M., Nakajima, K., Seo, et al
  2018; 362 (6415): 649–50
- **Single-beam dielectric-microsphere trapping with optical heterodyne detection** *PHYSICAL REVIEW A*
  Rider, A. D., Blakemore, C. P., Gratta, G., Moore, D. C.
  2018; 97 (1)
- **Magnetic bubble chambers and sub-GeV dark matter direct detection** *PHYSICAL REVIEW D*
  Bunting, P. C., Gratta, G., Melia, T., Rajendran, S.
  2017; 95 (9)
- **Measurement of the drift velocity and transverse diffusion of electrons in liquid xenon with the EXO-200 detector** *PHYSICAL REVIEW C*
  Albert, J. B., Barbeau, P. S., Beck, D., Belov, V., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Cen, W. R., Chambers, C., Cleveland, B., Coon, M., Craycraft, et al
  2017; 95 (2)
- **A density staggered cantilever for micron length gravity probing**
  Wang, Q., Rider, A. D., Moore, D. C., Blakemore, C. P., Cao, L., Gratta, G., IEEE
  IEEE.2017: 1773–78
- **Search for Screened Interactions Associated with Dark Energy below the 100?μm Length Scale.** *Physical review letters*
  Rider, A. D., Moore, D. C., Blakemore, C. P., Louis, M., Lu, M., Gratta, G.
  2016; 117 (10): 101101-?
- **An optimal energy estimator to reduce correlated noise for the EXO-200 light readout** *JOURNAL OF INSTRUMENTATION*
  Davis, C. G., Hall, C., Albert, J. B., Barbeau, P. S., Beck, D., Belov, V., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Cen, W. R., Chambers, C., Cleveland, et al
  2016; 11

- **First search for Lorentz and CPT violation in double beta decay with EXO-200** *PHYSICAL REVIEW D*
  Albert, J. B., Barbeau, P. S., Beck, D., Belov, V., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, C., Cleveland, B., Coon, M., Craycraft, A., Daniels, et al
  2016; 93 (7)

- **Cosmogenic backgrounds to 0 nu beta beta in EXO-200** *JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS*
  Albert, J. B., Auty, D. J., Barbeau, P. S., Beck, D., Belov, V., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, C., Cleveland, B., Coon, M., Craycraft, et al
  2016

- **Search for 2 nu beta beta decay of Xe-136 to the 0(1)(+) excited state of Ba-136 with the EXO-200 liquid xenon detector** *PHYSICAL REVIEW C*
  Albert, J. B., Auty, D. J., Barbeau, P. S., Beck, D., Belov, V., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, C., Chaves, J., Cleveland, B., Coon, et al
  2016; 93 (3)

- **Testing long-distance modifications of gravity to 100 astronomical units** *PHYSICAL REVIEW D*
  Buscaino, B., DeBra, D., Graham, P. W., Gratta, G., Wiser, T. D.
  2015; 92 (10)

- **Measurements of the ion fraction and mobility of alpha- and beta-decay products in liquid xenon using the EXO-200 detector** *PHYSICAL REVIEW C*
  Albert, J. B., Auty, D. J., Barbeau, P. S., Beck, D., Belov, V., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, C., Cleveland, B., Coon, M., Craycraft, et al
  2015; 92 (4)

- **Characterization of Silicon Photomultipliers for nEXO** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
  Ostrovskiy, I., Retiere, F., AUTY, D., Dalmasson, J., Didberidze, T., DeVoe, R., Gratta, G., Huth, L., James, L., Lupin-Jimenez, L., Ohmart, N., Piepke, A.
  2015; 62 (4): 1825-1836

- **Investigation of radioactivity-induced backgrounds in EXO-200** *PHYSICAL REVIEW C*
  Albert, J. B., Auty, D. J., Barbeau, P. S., Beck, D., Belov, V., Benitez-Medina, C., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, C., Cleveland, B., Coon, et al
  2015; 92 (1)

- **An RF-only ion-funnel for extraction from high-pressure gases** *INTERNATIONAL JOURNAL OF MASS SPECTROMETRY*
  Brunner, T., Fudenberg, D., Varentsov, V., Sabourov, A., Gratta, G., Dilling, J., DeVoe, R., Sinclair, D., Fairbank, W., Albert, J. B., Auty, D. J., Barbeau, P. S., Beck, et al
  2015; 379: 110-120

- **Spectroscopy of Ba and Ba+ deposits in solid xenon for barium tagging in nEXO** *PHYSICAL REVIEW A*
  Mong, B., COOK, S., Walton, T., Chambers, C., Craycraft, A., Benitez-Medina, C., Hall, K., Fairbank, W., Albert, J. B., Auty, D. J., Barbeau, P. S., BASQUE, V., Beck, et al
  2015; 91 (2)

- **A compact ultra-clean system for deploying radioactive sources inside the KamLAND detector** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Banks, T. I., Freedman, S. J., Wallig, J., Ybarrolaza, N., Gando, A., Gando, Y., Ikeda, H., Inoue, K., Kishimoto, Y., Koga, M., Mitsui, T., Nakamura, K., Shimizu, et al
  2015; 769: 88-96

- **Laboratory studies on the removal of radon-born lead from KamLAND's organic liquid scintillator** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Keefer, G., Grant, C., Piepke, A., Ebihara, T., Ikeda, H., Kishimoto, Y., Kibe, Y., Koseki, Y., Ogawa, M., Shirai, J., Takeuchi, S., Mauger, C., Zhang, et al
  2015; 769: 79-87

- **Search for millicharged particles using optically levitated microspheres.** *Physical review letters*
  Moore, D. C., Rider, A. D., Gratta, G.
  2014; 113 (25): 251801-?

- **Search for Majoron-emitting modes of double-beta decay of Xe-136 with EXO-200** *PHYSICAL REVIEW D*
  Albert, J. B., Auty, D. J., Barbeau, P. S., Beauchamp, E., Beck, D., Belov, V., Benitez-Medina, C., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, C., Chaves, et al

2014; 90 (9)

- **An apparatus to manipulate and identify individual Ba ions from bulk liquid Xe** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Twelker, K., Kravitz, S., Montero Diez, M., Gratta, G., Fairbank, W., Albert, J. B., Auty, D. J., Barbeau, P. S., Beck, D., Benitez-Medina, C., Breidenbach, M., Brunner, T., Cao, et al
  2014; 85 (9)

- **Search for Majorana neutrinos with the first two years of EXO-200 data** *NATURE*
  Albert, J. B., Auty, D. J., Barbeau, P. S., Beauchamp, E., Beck, D., Belov, V., Benitez-Medina, C., Bonatt, J., Breidenbach, M., Brunner, T., Burenkov, A., Cao, G. F., Chambers, et al
  2014; 510 (7504): 229-234

- **Improved measurement of the 2 nu beta beta half-life of Xe-136 with the EXO-200 detector** *PHYSICAL REVIEW C*
  Albert, J. B., Auger, M., Auty, D. J., Barbeau, P. S., Beauchamp, E., Beck, D., Belov, V., Benitez-Medina, C., Bonatt, J., Breidenbach, M., Brunner, T., Burenkov, A., Cao, et al
  2014; 89 (1)

- **A setup for Ba-ion extraction from high pressure Xe gas for double-beta decay studies with EXO** *16th International Conference on ElectroMagnetic Isotope Separators and Techniques Related to their Applications (EMIS)*
  Brunner, T., Fudenberg, D., Sabourov, A., Varentsov, V. L., Gratta, G., Sinclair, D.
  ELSEVIER SCIENCE BV.2013: 473–475

- **Present Status and Future Perspectives for the EXO-200 Experiment** *ADVANCES IN HIGH ENERGY PHYSICS*
  Gratta, G., Sinclair, D.
  2013

- **Search for Neutrinoless Double-Beta Decay in Xe-136 with EXO-200** *PHYSICAL REVIEW LETTERS*
  Auger, M., Auty, D. J., Barbeau, P. S., Beauchamp, E., Belov, V., Benitez-Medina, C., Breidenbach, M., Brunner, T., Burenkov, A., Cleveland, B., COOK, S., Daniels, T., Danilov, et al
  2012; 109 (3)

- **Xenon purity analysis for EXO-200 via mass spectrometry** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Dobi, A., Hall, C., Slutsky, S., Yen, Y., Aharmin, B., Auger, M., Barbeau, P. S., Benitez-Medina, C., Breidenbach, M., Cleveland, B., Conley, R., Cook, J., COOK, et al
  2012; 675: 40-46

- **The EXO-200 detector, part I: detector design and construction** *JOURNAL OF INSTRUMENTATION*
  Auger, M., Auty, D. J., Barbeau, P. S., Bartoszek, L., Baussan, E., Beauchamp, E., Benitez-Medina, C., Breidenbach, M., Chauhan, D., Cleveland, B., Conley, R., Cook, J., COOK, et al
  2012; 7

- **SEARCH FOR EXTRATERRESTRIAL ANTINEUTRINO SOURCES WITH THE KamLAND DETECTOR** *ASTROPHYSICAL JOURNAL*
  Gando, A., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kibe, Y., Kishimoto, Y., Koga, M., Minekawa, Y., Mitsui, T., Morikawa, T., Nagai, N., Nakajima, et al
  2012; 745 (2)

- **A large Bradbury Nielsen ion gate with flexible wire spacing based on photo-etched stainless steel grids and its characterization applying symmetric and asymmetric potentials** *INTERNATIONAL JOURNAL OF MASS SPECTROMETRY*
  Brunner, T., Mueller, A. R., O'Sullivan, K., Simon, M. C., Kossick, M., Ettenauer, S., Gallant, A. T., MANE, E., Bishop, D., GOOD, M., Gratta, G., Dilling, J.
  2012; 309: 97-103

- **A xenon gas purity monitor for EXO** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Dobi, A., Hall, C., HERRIN, S., Odian, A., Prescott, C. Y., Rowson, P. C., Ackerman, N., Aharmin, B., Auger, M., Barbeau, P. S., Barry, K., Benitez-Medina, C., Breidenbach, et al
  2011; 659 (1): 215-228

- **Observation of Two-Neutrino Double-Beta Decay in Xe-136 with the EXO-200 Detector** *PHYSICAL REVIEW LETTERS*
  Ackerman, N., Aharmim, B., Auger, M., Auty, D. J., Barbeau, P. S., Barry, K., Bartoszek, L., Beauchamp, E., Belov, V., Benitez-Medina, C., Breidenbach, M., Burenkov, A., Cleveland, et al
  2011; 107 (21)

- **A magnetically driven piston pump for ultra-clean applications** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  LePort, F., Neilson, R., Barbeau, P. S., Barry, K., Bartoszek, L., Counts, I., Davis, J., DeVoe, R., Dolinski, M. J., Gratta, G., Green, M., Diez, M. M., Mueller, et al
  2011; 82 (10)

- **Measurement of the B-8 solar neutrino flux with the KamLAND liquid scintillator detector** *PHYSICAL REVIEW C*
  Abe, S., Furuno, K., Gando, A., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kibe, Y., Kimura, W., Kishimoto, Y., Koga, M., Minekawa, Y., Mitsui, et al
  2011; 84 (3)

- **Partial radiogenic heat model for Earth revealed by geoneutrino measurements** *NATURE GEOSCIENCE*
  Gando, A., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kibe, Y., Kishimoto, Y., Koga, M., Minekawa, Y., Mitsui, T., Morikawa, T., Nagai, N., Nakajima, et al
  2011; 4 (9): 647-651

- **Constraints on theta(13) from a three-flavor oscillation analysis of reactor antineutrinos at KamLAND** *PHYSICAL REVIEW D*
  Gando, A., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kibe, Y., Kishimoto, Y., Koga, M., Minekawa, Y., Mitsui, T., Morikawa, T., Nagai, N., Nakajima, et al
  2011; 83 (5)

- **A simple radionuclide-driven single-ion source** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Diez, M. M., Twelker, K., Fairbank, W., Gratta, G., Barbeau, P. S., Barry, K., DeVoe, R., Dolinski, M. J., Green, M., LePort, F., Mueller, A. R., Neilson, R., O'Sullivan, et al
  2010; 81 (11)

- **Search for acoustic signals from ultrahigh energy neutrinos in 1500 km(3) of sea water** *PHYSICAL REVIEW D*
  Kurahashi, N., Vandenbroucke, J., Gratta, G.
  2010; 82 (7)

- **In search of no neutrinos** *PHYSICS WORLD*
  Gratta, G., Kurahashi, N.
  2010; 23 (4): 27-30

- **Production of radioactive isotopes through cosmic muon spallation in KamLAND** *PHYSICAL REVIEW C*
  Abe, S., Enomoto, S., Furuno, K., Gando, Y., Ikeda, H., Inoue, K., Kibe, Y., Kishimoto, Y., Koga, M., Minekawa, Y., Mitsui, T., Nakajima, K., Nakajima, et al
  2010; 81 (2)

- **Characterization of large area APDs for the EXO-200 detector** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Neilson, R., LePort, F., Pocar, A., Kumar, K. S., Odian, A., Prescott, C. Y., TENEV, V., Ackerman, N., Akimov, D., Auger, M., Benitez-Medina, C., Breidenbach, M., Burenkov, et al
  2009; 608 (1): 68-75

- **Uncertainties in the anti-neutrino production at nuclear reactors** *JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS*
  Djurcic, Z., Detwiler, J. A., Piepke, A., FOSTER, V. R., Miller, L., Gratta, G.
  2009; 36 (4)

- **The KamLAND full-volume calibration system** *JOURNAL OF INSTRUMENTATION*
  Berger, B. E., Busenitz, J., Classen, T., Decowski, M. P., Dwyer, D. A., Elor, G., Frank, A., Freedman, S. J., Fujikawa, B. K., Galloway, M., Gray, F., Heeger, K. M., Hsu, et al
  2009; 4

- **Oceanic ambient noise as a background to acoustic neutrino detection** *PHYSICAL REVIEW D*
  Kurahashi, N., Gratta, G.
  2008; 78 (9)

- **Systematic study of trace radioactive impurities in candidate construction materials for EXO-200** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Leonard, D. S., Grinberg, P., Weber, P., Baussan, E., Djurcic, Z., Keefer, G., Piepke, A., Pocar, A., Vuilleumier, J., Vuilleumier, J., Akimov, D., Bellerive, A., Bowcock, et al
  2008; 591 (3): 490-509

- **Precision measurement of neutrino oscillation parameters with KamLAND** *PHYSICAL REVIEW LETTERS*
  Abe, S., Ebihara, T., Enomoto, S., Furuno, K., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kibe, Y., Kishimoto, Y., Koga, M., Kozlov, A., Minekawa, et al

2008; 100 (22)

- **A microfabricated sensor for thin dielectric layers** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Fierlinger, P., DeVoe, R., Flatt, B., Gratta, G., Green, M., Kolkowitz, S., LePort, F., Diez, M. M., Neilson, R., O'Sullivan, K., Pocar, A., Wodin, J.
  2008; 79 (4)

- **A liquid xenon ionization chamber in an all-fluoropolymer vessel** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  LePort, F., Pocar, A., Bartoszek, L., DeVoe, R., Fierlinger, P., Flatt, B., Gratta, G., Green, M., Koffas, T., Diez, M. M., Neilson, R., O'Sullivan, K., Waldman, et al
  2007; 578 (2): 409-420

- **Observation of single collisionally cooled trapped ions in a buffer gas** *PHYSICAL REVIEW A*
  Green, M., Wodin, J., DeVoe, R., Fierlinger, P., Flatt, B., Gratta, G., LePort, F., Diez, M. M., Neilson, R., O'Sullivan, K., Pocar, A., Waldman, S., Leonard, et al
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- **A linear RFQ ion trap for the enriched xenon observatory** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Flatt, B., Green, M., Wodin, J., DeVoe, R., Fierlinger, P., Gratta, G., LePort, F., Diez, M. M., Neilson, R., O'Sullivan, K., Pocar, A., Waldman, S., Baussan, et al
  2007; 578 (2): 399-408

- **Search for the invisible decay of neutrons with KamLAND** *PHYSICAL REVIEW LETTERS*
  Araki, T., Enomoto, S., Furuno, K., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kishimoto, Y., Koga, M., Koseki, Y., Maeda, T., Mitsui, T., Motoki, et al
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- **Mobility of thorium ions in liquid xenon** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
  Wamba, K., Hall, C., Breidenbach, M., Conley, R., Odian, A., Prescott, C. Y., Rowson, P. C., Sevilla, J., Skarpaas, K., DeVoe, R., Djurcic, Z., Fairbank, W. M., Gratta, et al
  2005; 555 (1-2): 205-210

- **Experimental investigation of geologically produced antineutrinos with KamLAND** *NATURE*
  Araki, T., Enomoto, S., Furuno, K., Gando, Y., Ichimura, K., Ikeda, H., Inoue, K., Kishimoto, Y., Koga, M., Koseki, Y., Maeda, T., Mitsui, T., Motoki, et al
  2005; 436 (7050): 499-503

- **Measurement of neutrino oscillation with KamLAND: Evidence of spectral distortion** *PHYSICAL REVIEW LETTERS*
  Araki, T., Eguchi, K., Enomoto, S., Furuno, K., Ichimura, K., Ikeda, H., Inoue, K., Ishihara, K., Iwamoto, T., Kawashima, T., Kishimoto, Y., Koga, M., Koseki, et al
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- **Experimental study of acoustic ultra-high-energy neutrino detection** *ASTROPHYSICAL JOURNAL*
  Vandenbroucke, J., Gratta, G., Lehtinen, N.
  2005; 621 (1): 301-312

- **EXO: an advanced enriched xenon double-beta decay observatory** *8th International Workshop on Topics in Astroparticle and Underground Physics*
  Akimov, D., Bower, G., Breidenbach, M., Conley, R., Conti, E., Danilov, M., DeVoe, R., Djurcic, Z., Dolgolenko, A., Fairbank, W., Gratta, G., Hall, C., Koffas, et al
  ELSEVIER SCIENCE BV.2005: 224–226

- **High sensitivity search for (nu)over-bar(e)'s from the Sun and other sources at KamLAND** *PHYSICAL REVIEW LETTERS*
  Eguchi, K., Enomoto, S., Furuno, K., Ikeda, H., Ikeda, K., Inoue, K., Ishihara, K., Iwamoto, T., Kawashima, T., Kishimoto, Y., Koga, M., Koseki, Y., Maeda, et al
  2004; 92 (7)

- **Correlated fluctuations between luminescence and ionization in liquid xenon** *PHYSICAL REVIEW B*
  Conti, E., DeVoe, R., Gratta, G., Koffas, T., Waldman, S., Wodin, J., Akimov, D., Bower, G., Breidenbach, M., Conley, R., Danilov, M., Djurcic, Z., Dolgolenko, et al
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- **First results from KamLAND: Evidence for reactor antineutrino disappearance** *PHYSICAL REVIEW LETTERS*
  Eguchi, K., Enomoto, S., Furuno, K., Goldman, J., Hanada, H., Ikeda, H., Ikeda, K., Inoue, K., Ishihara, K., Itoh, W., Iwamoto, T., Kawaguchi, T., Kawashima, et al
  2003; 90 (2)

- **Nuclear propelled vessels and neutrino oscillation experiments** *PHYSICAL REVIEW LETTERS*
  Detwiler, J., Gratta, G., Tolich, N., Uchida, Y.
  2002; 89 (19)
- **Sensitivity of an underwater acoustic array to ultra-high energy neutrinos** *ASTROPARTICLE PHYSICS*
  Lehtinen, N. G., Adam, S., Gratta, G., Berger, T. K., Buckingham, M. J.
  2002; 17 (3): 279-292
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  Bemporad, C., Gratta, G., Vogel, P.
  2002; 74 (2): 297-328
- **Nuclear reactor safeguards and monitoring with antineutrino detectors** *JOURNAL OF APPLIED PHYSICS*
  Bernstein, A., Wang, Y., Gratta, G., West, T.
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- **Final results from the Palo Verde neutrino oscillation experiment** *PHYSICAL REVIEW D*
  Boehm, F., Busenitz, J., Cook, B., Gratta, G., Henrikson, H., Kornis, J., LAWRENCE, D., Lee, K. B., McKinny, K., Miller, L., Novikov, V., Piepke, A., Ritchie, et al
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- **Predicting neutron production from cosmic-ray muons** *PHYSICAL REVIEW D*
  Wang, Y. F., Balic, V., Gratta, G., Fasso, A., Roesler, S., Ferrari, A.
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- **Calibration of the L3 BGO calorimeter using an RFQ accelerator** *8th Pisa Meeting on Advanced Detectors*
  Chaturvedi, U., Favara, A., Gataullin, M., Gratta, G., Kirkby, D., Lu, W., Newman, H., Shvorob, A., Tully, C., Zhu, R.
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- **Search for neutrino oscillations at the Palo Verde nuclear reactors** *XIXTH International Conference on neutrino Physics and Astrophysics*
  Boehm, F., Busenitz, J., Cook, B., Gratta, G., Henrikson, H., Kornis, J., LAWRENCE, D., Lee, K. B., McKinny, K., Miller, L., Novikov, V., Piepke, A., Ritchie, et al
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  Boehm, F., Busenitz, J., Cook, B., Gratta, G., Henrikson, H., Kornis, J., LAWRENCE, D., Lee, K. B., McKinny, K., Miller, L., Novikov, V., Piepke, A., Ritchie, et al
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  Boehm, F., Busenitz, J., Cook, B., Gratta, G., Henrikson, H., Kornis, J., LAWRENCE, D., Lee, K. B., McKinny, K., Miller, L., Novikov, V., Piepke, A., Ritchie, et al
  2000; 62 (7)
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