

CURRICULUM VITAE

Lester Ingber, Ph.D.

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Brief Summary

Professional Experience

- Over 100 publications
- Physical Studies Institute LLC, CEO 2003-Current
- San Diego Supercomputer (SDSC), Principal Investigator 2023-Current
- Stony Brook University OoKAMI Supercomputer (SUNY SB), Principal Investigator 2021-Current
- Int. J. Applied Math., Computat. Science and Systems Engin., Editor-in-Chief 2021-2021
- Extreme Science and Engineering Discovery Environment (XSEDE.org), Principal Investigator 2013-2021
- Pion Capital, Partner 2011-2013
- Research Publisher, Editor-in-Chief 2012-2012
- DUNN Capital Management, Stuart FL, Director R&D 2002-2003
- DRW Trading, Chicago IL, Director R&D 1997-2001
- George Washington University, Research Professor of Mathematics 1989-1990
- National Research Council, Senior Research Associate 1989-1989
- US Army Concepts Analysis Agency, Guest Professor 1989-1989
- Naval Postgraduate School, Professor of Physics 1986-1989
- National Research Council, Senior Research Associate 1985-1986
- Physical Studies Institute, President Nonprofit Corp. 1970-1986
- UC San Diego, Asst. Research Physicist 1970-1972
- State University New York at Stony Brook, Asst. Professor of Physics 1969-1970

Education

- National Science Foundation Postdoc, UC Berkeley and UC Los Angeles 1967-1969
- University of California San Diego, 1962-1967, Ph.D. Theoretical Nuclear Physics
- California Institute of Technology, 1958-1962, B.S. Physics
- Brooklyn Technical High School, 1954-1958, Diploma

Published Expertise

- Summary of Projects — https://www.ingber.com/ingber_projects_brief.pdf
- Statistical Mechanics of Financial Markets — Options, Bond Futures, Trading Systems, Risk
- Statistical Mechanics of Neocortical Interactions — Memory, EEG, Intelligent Systems
- Statistical Mechanics of Combat — Baselined Simulations to Exercise Data
- Stochastic Algorithms — Simulated Annealing Optimization and Path Integration
- Theoretical Nuclear Physics — Nucleon-Nucleon Scattering, Nuclear Matter, Neutron Stars
- Teaching Methodologies — Private School Developed High-School and College Curricula
- Physics of Karate — Teaching Methodology Leading to 8th-Dan Black Belt

Positions

2003-Current	Physical Studies Institute LLC	R&D, CEO
2023-Current	San Diego Supercomputer (SDSC.edu)	Principal Investigator
2021-Current	StonyBrook.edu (SUNY SB) Ookami supercomputer	Principal Investigator
2021-2021	Int. J. Applied Math., Computat. Science and Systems Engin.	Editor-in-Chief
2013-2021	Extreme Science Engineering Discovery Environment (XSEDE)	Principal Investigator
2011-2013	Pion Capital, Round Rock TX	Partner
2012-2012	Research Publisher	Editor-in-Chief 3 Journals
2002-2003	DUNN Capital Mgmt, Stuart FL	Director R&D
1997-2001	DRW Trading, Chicago	Director R&D
1989-1997	Physical Studies Institute	R&D
1989-1990	George Washington University Dept of Mathematics, DC	Research Professor
1989-1989	Naval Ocean Systems Center San Diego, CA	Senior Research Associate National Research Council NAS
1989-1989	USA Concepts Analysis Agency Bethesda, MD	Guest Professor Extended Temporary Duty
1986-1989	NPS Physics Dept GS-15 Step 10 Equiv.	Professor of Physics
1986-1988	ANSER (Nonprofit Lab) Arlington, VA	Consultant
1985-1986	Naval Postgraduate School (NPS) Monterey, CA	Senior Research Associate National Research Council NAS
1980-1986	UC San Diego, IPAPS	Research Associate
1972-1978	Physical Studies Institute	Director Alternative School
1970-1978	Physical Studies Institute San Diego, CA	President
1972-1974	UC San Diego, Music Dept	Research Associate
1972-1973	UC San Diego Extension	Director, Learning to Learn
1970-1972	UC San Diego, Physics Dept Institute for Pure & Applied Physical Sciences (IPAPS)	Asst. Research Physicist
1969-1970	SU New York Stony Brook Physics Department	Asst. Professor
1968-1969	UC Los Angeles, Physics Dept	NSF.gov Postdoctoral Fellow
1967-1968	UC Berkeley, Physics Dept	NSF.gov Postdoctoral Fellow Lecturer
1965-1966	RAND Corp., Santa Monica	Consultant
1962-1967	UC San Diego, Physics Dept	Research Assistant
1964-1964	UCSD/Niels Bohr Institute	
1960-1962	Caltech	Research Asst.: Metallurgy
1961-1962	Caltech	Grader: Math Physics (graduate)
1960-1961	Caltech	Grader: Algebra (undergraduate)

SCIENTIFIC PURSUITS

Prof. Lester Ingber has published over 100 papers and books in the categories of: theoretical physics, neuroscience, finance, optimization, combat analysis, karate, and education. As CEO of Physical Studies Institute LLC (PSI) he develops and consults on projects documented in the archive

<https://www.ingber.com/>

Nuclear Physics

From 1965-1972 he published in atomic, nuclear, astro-, and elementary particle physics. His major work was to develop a nucleon-nucleon interaction described by exchanged mesons, and to apply this interaction to calculate properties of nucleon-nucleon scattering, the deuteron, nuclear matter, and neutron stars. In 1983-1986 he used modern methods of nonlinear functional analysis developed in the late 1970's to discover contributions induced by velocity-dependent potentials to nuclear matter binding energies.

Neuroscience

Since 1978 he has developed a statistical mechanics of neocortical interactions applicable to a broad range of spatial and temporal scales, using modern methods of nonlinear nonequilibrium statistical mechanics of neocortical interactions (SMNI) to calculate brain 'observables', e.g., short-term memory and EEG analyses. His 1983 *Physical Review paper* was the first paper accepted on the brain in this premier physics journal. From Feb 2013 through Dec 2021, he used XSEDE.org resources, extending the range of SMNI from EEG to molecular processes, and developing quantum algorithms that have broad applications ranging from computational neuroscience to computational physics to blockchains. From 2021 he is using the StonyBrook.edu OOkami supercomputer for similar projects. A current project at the OOkami supercomputer at StonyBrook.edu uses Classical Computers with qPATHINT codes to develop classical SMNI interacting with quantum tripartite neuron-astrocyte-neuron synaptic interactions.

Finance

Since 1980 he has developed a statistical mechanics approach to financial markets, e.g., to multivariable term structure and stochastic markets. His 1990 *Physical Review paper* was the first paper accepted on finance in this premier physics journal. From 1997-2001, as Director R&D at DRW Trading in Chicago, he led a team developing multi-factor nonlinear stochastic models of markets. From 2002-2003 he was Director R&D at DUNN Capital Management in Stuart FL, developing risk-management algorithms. From 2011-2013 he was a Partner in Pion Capital, a hedge-fund partnership of Caltech alumni. Previous projects have used qPATHINT and qPATHTREE to develop quantum options on quantum money.

Optimization/Modeling

Since 1987 he has developed Adaptive Simulated Annealing (ASA), one of the most powerful optimization algorithms for nonlinear and stochastic systems, working with thousands of users. Other codes have been developed to model multivariate nonlinear stochastic systems. In 1994-1995, as principal investigator (PI) of an NSF Supercomputer grant, he ported his ASA and PATHINT codes onto parallel supercomputers.

Combat Simulation

From 1986-1989, as PI of an Army contract, he applied these methods of mathematical physics, leading a team of scientists and officers to develop mathematical comparisons of Janus computer combat simulations with exercise data from the National Training Center (NTC), developing a testable theory of combat successfully baselined to empirical data.

EDUCATION AND POSITIONS

Education

He received: his diploma from Brooklyn Technical High School in 1958; his B.S. in physics from Caltech in 1962; his Ph.D. in theoretical nuclear physics from UC San Diego in 1967, having studied at the Niels Bohr Institute in 1964, and having consulted at RAND in 1965-1966.

Positions

He was a National Science Foundation Postdoctoral Fellow at UC Berkeley in 1967-1968 and at UC Los Angeles in 1968-1969, an Assistant Professor in physics at SUNY at Stony Brook (SUNY SB) from 1969-1970, and a research physicist in the Physics department and in the Institute for Pure and Applied Physical Sciences (IPAPS) at UC San Diego from 1970-1972. From 1970-1986 he was President of Physical Studies Institute Inc. (PSI), a nonprofit corporation he founded in 1970, which was an agency account in IPAPS from 1980-1986. From 1970-1972 he developed teaching methodologies for academics and fine arts, instructing in and administrating a six-course program through UC San Diego Extension. From 1972-1978, though PSI, he founded, funded, and instructed in an experimental alternative high school offering 30+ courses in academics, fine arts, and physical disciplines.

He was a Research Associate at UC San Diego in the Music department from 1972-1974 and in IPAPS from 1980-1986. He was awarded a Senior Research Associateship for 1985-1986 by the National Research Council (NRC) of the National Academy of Sciences, taken at the Naval Postgraduate School (NPS) in Monterey, CA. From 1986-1989 he was Professor of Physics at NPS at a GS-15 Step 10 equivalent position. In March 1988 he was officially offered a Senior Executive Service (SES) appointment as Assistant Director of the Joint Tactical C³ Agency (JTC3A); he declined to complete his projects. From February through June 1989 he was on extended temporary duty at US Army Concepts Analysis Agency (CAA) in Bethesda, MD. In 1989 He won a second NRC Senior Research Associateship, taken at the Naval Ocean Systems Center (NOSC) in San Diego. From 1989-1990 he was Research Professor of Mathematics at The George Washington University (GWU), D.C.

From 1989-1997, through Physical Studies Institute LLC (PSI), he consulted on projects in his fields of expertise. From 1997-2001 he was Director of Research and Development at DRW Trading, a trading firm in Chicago, IL. From 2002-2003 he was Director R&D at DUNN Capital Management in Stuart FL. In 2012 he was Editor-in-Chief at Research Publisher in Santa Clara, CA for three journals and associated e-conferences. From 2011-2013 he was a Partner in Pion Capital, a hedge-fund partnership of Caltech alumni. In 2021 he was Editor-in-Chief of Int. J. Applied Math., Computat. Science and Systems Engin. From Feb 2013 through Dec 2021 he was a PI of XSEDE.org physics projects. From Apr 2021 he is a PI of SUNY OoKAMI supercomputer SUNY SB physics projects. Since 2005 through PSI he conducts research in selected interdisciplinary projects.

OTHER PURSUITS**Karate**

From 1958-1988 he founded and instructed karate classes at: Caltech, UC Berkeley, UC Los Angeles, SU New York at Stony Brook (SUNY SB), UC San Diego, PSI, and NPS. He has developed and published in several textbooks techniques promoting the learning of attentional skills in parallel with a physics approach to the learning of traditional physical skills. He received his black belt in karate in 1961 and became the first Westerner to receive the Instructor's degree from the Japan Karate Association (JKA) in 1968. Now he is an 8th Dan black belt. From 1989-1991 he was Director of Scientific Studies of the American JKA Karate Associations (AJKA). From 2008-2009 he was an 8th Dan Officer of The International Alliance for Shotokan Karate (IASK).

Married

Since 1976 he and his spouse Louise Ingber have been partners in several projects, including running a ballet company and karate studio (1976-1985). He helps with cleanup for her chocolate and pastry business [<https://creekhousechocolates.com>].

Professional Experience

PSI — Projects and Interdisciplinary Research 2003-Current

As CEO of Physical Studies Institute LLC (PSI) [PhysicalStudiesInstitute.org] I pursue research and consult in several disciplines in which I have gained expertise over several decades. The total number of publications in these fields is over one hundred. The file https://www.ingber.com/psi_computational_physics_group.html is updated with current projects, e.g., “Synchronous Interactions Between Quantum and Macroscopic Systems”.

I continue my research in statistical mechanics of multivariate nonlinear systems, which have included: Statistical Mechanics of Neocortical Interactions (SMNI), Statistical Mechanics of Combat (SMC), Statistical Mechanics of Financial Markets (SMFM), Trading in Risk Dimensions (TRD), and Statistical Mechanical Numerical Tools such as my optimization algorithm Adaptive Simulated Annealing (ASA), and Classical and Quantum path-integral algorithms [q]PATHTREE and [q]PATHINT.

Often I collaborate via the internet on such projects. Summaries are usually updated in https://www.ingber.com/ingber_projects.html. I continue to answer short technical queries on my publications and codes at no charge. I still maintain and update my ASA code, available at no charge from my archive <https://www.ingber.com>. Mirrors of the ASA code are at <https://asacaltech.sourceforge.net> and <https://code.google.com/p/adaptive-simulated-annealing>.

At my Github site <https://github.com/ingber> I have several repositories containing various levels of code: {adaptive-simulated-annealing, COVID-19, EEG_qCa, qMAXIMA, qPATHINT, qPATHTREE, spline-Laplacian, TRD}.

I regularly put aside time for anonymous or signed reviews, usually a few per month. Most of my reviews for 50+ journals or scientific agencies are of interdisciplinary subjects since my own interests have led me through a few interdisciplinary projects. Such reviews often have a different nature than reviews in relatively well-established disciplines where expert opinions can be considered definitive.

I continue to educate people on the art and science of karate. I am an 8th Dan black belt. My three karate text books and other files are available at no charge on my internet archive.

In December 2019, In 2003 I changed the name of my from Lester Ingber Research to Sole Proprietorship to Physical Studies Institute (PSI) to better reflect my collaborations as well as my projects. PSI was a sole Proprietorship. In February 2020, PSI was changed to Physical Studies Institute LLC.

Physical Studies Institute (PSI) was a 501(c)(3) nonprofit scientific and educational California corporation I founded in 1970 and kept in operation through 1991. From 1980-1986, PSI was an independent agency account of the Institute for Pure and Applied Physical Sciences (IPAPS) at UC San Diego. From 1970-1978 I personally funded and administrated the Institute for Study of Attention (ISA) High School, a subsidiary of PSI, developing and publishing an educational methodology emphasizing restructuring of standard text material to enhance personal learning strengths. We offered over 30 courses in academics, fine arts and physical disciplines.

From 1981-1986 I helped administrate another subsidiary, Conservatory of Ballet Arts Company (CBAC), consisting of over 100 students, and an active dancing group of about 30. CBAC was founded by my wife, Louise Ingber, an accomplished Ballet dancer. She has since founded Creek House Chocolates (see CreekHouseChocolates.com/about), a subsidiary of Creek House Patisserie LLC.

San Diego Supercomputer (SDSC.edu) 2023-

In addition to my grants of CPU time and storage on OoKAMI (immediately below), I have an additional grant of CPU time and storage on the San Diego Super-Computer for “Quantum Variables in Finance”, calculating Implied Volatility for financial options using this Classical supercomputer to calculate Implied Volatility in quantum spaces.

Stony Brook (StonyBrook.edu) Ookami Supercomputer 2021-

From 28 Jun 2021 I have had a grant of CPU time and resources on the State University of New York at Stony Brook [StonyBrook.edu] Ookami supercomputer for my project “Hybrid classical-quantum computing: Applications to statistical mechanics of neocortical interactions”.

My recent SMNI projects are described in https://www.ingber.com/psi_computational_physics_group.html.

Int. J. Applied Math., Computat. Science and Systems Engin. — Editor-in-Chief Jun 2021 - 1 Nov 2021

I was Editor-in-Chief of the International Journal of Applied Mathematics, Computational Science and Systems Engineering [<http://amcse.org/>].

Extreme Science and Engineering Discovery Environment (XSEDE.org) (Now ACCESS-CI.org) 2013-2021

Since 20 Feb 2013 through 30 Dec 2021, I held yearly grants as a Principal Investigator (PI) on various physics, finance and neuroscience projects at The Extreme Science and Engineering Discovery Environment (XSEDE.org), using their supercomputer resources.

These projects have produced calculations and fits to experimental data supporting those calculations, which built on my SMNI work that has had multiple publications since 1981. Although all results have been reasonably successful — it is hard for just about any research using human data to be 100% perfect — this work awaits experimental proof or disproof of my calculations of short-term memory (STM), and/or interactions between quantum scales of Ca²⁺ ions and macroscopic scales of highly synchronous neuronal firings during STM. These codes have broad applications, e.g., ranging from computational neuroscience to computational physics to blockchains.

Some similar prior work was accomplished in 1994-1995 when I was PI of an NSF Pittsburgh Supercomputing Center (PSC) Grant, "Porting Adaptive Simulated Annealing and Path Integral Calculations to the Cray; Parallelizing ASA and PATHINT Project" (PAPP).

Reviews of the former project are at https://www.ingber.com/smni14_eeg_ca_JTB_reviews.txt, and some press releases are at <https://www.xsede.org/mechanism-of-short-term-memory>, https://www.sdsc.edu/News%20Items/PR041414_short_term_memory.html, and https://ucsdnews.ucsd.edu/pressrelease/the_mechanism_of_short_term_memory.

Pion Capital — Partner 2011-2013

Pion Capital was a hedge-fund partnership of Caltech alumni. I helped this early-stage start-up by representing them as a Partner to vendors to get good pricing for datafeeds and co-location of their systems, and by building interfaces for such feeds. I benchmarked some of my own TRD trading systems in their formats. I worked on various administrative and R&D projects.

Research Publisher — Editor-in-Chief 2012-2012

I was Editor-in-Chief for Research Publisher for: Current Progress Journal (timely topics in science), Graduate Journal of Research, and Undergraduate Journal of Research, and associated e-conferences for these three journals. I recruited and set up their Editorial Boards.

DUNN Capital Management — Director Research & Development 2002-2003

From January 2002 to June 2003, I was Director R&D at DUNN Capital Management, then a \$billion hedge fund in Stuart FL. Their contract included a non-compete agreement expiring 1 December 2004. I developed state of the art copula risk-management algorithms and worked with others to enhance and

perform due diligence on trading models.

DRW Trading — Director Research & Development 1997-2001

From July 1997 to December 2001, I was Director R&D at DRW Trading, a Chicago-based proprietary trading firm. Although all projects, initiated by agreement with or requested by traders, were brought to proper focus and completion, most of our products were not implemented as the company quickly expanded five-fold. Projects included: (a) Developing my previously published PATHINT numerical algorithms, and a novel fast tree algorithm motivated by PATHINT, PATHTREE, to process new multivariate nonlinear generalizations of currently used options models. (b) Modeling indexes and options on indexes and baskets of their components, including risk scenarios and dynamic balancing of portfolios using my published Adaptive Simulated Annealing (ASA) code (an importance-sampling optimization algorithm). (c) Developing an optimized inter-minute computerized trading system, based on my published studies using Canonical Momenta Indicators (CMI). (d) Modeling US and German Cheapest-To-Deliver futures contracts on bonds. (e) Modeling Eurodollar and US Treasury options. (f) Optimizing portfolios of other traders, enhancing the effectiveness of their trading rules. (g) Directing mathematical modeling of codes being prepared for a commercial risk-management product, including preparation for exotic and energy options modules. (h) Working with other team members to obtain and integrate several data resources into a central database accessible to traders as well as to analysts. (i) Working with other team members to develop an electronic trading system interface to exchanges, prototyped using Canonical Momenta Indicators. (j) Leading, managing and administrating many projects associated with a growing company.

PSI — Interdisciplinary Research 1989-1997

I have made available in a public archive, Adaptive Simulated Annealing (ASA), the optimization algorithm of choice for many complex problems. From 1993-1996, ASA was located at <https://www.alumnus.caltech.edu/~ingber/>. Pointers were placed in NETLIB and STATLIB to this location. As the archive grew, more room and maintenance was required, and in February 1996 the site was moved to the present [ingber.com](https://www.ingber.com) location. Pointers were placed in the Caltech site to the present locations. Since 1992 I have helped several thousand people with my code and papers via electronic mail, processing hundreds of queries per year on ASA.

Through Physical Studies Institute (PSI), I further developed mathematical and numerical algorithms for selected problems in finance, combat analysis, and optimization, creating and testing multivariate nonlinear models. As published in over 30 papers during this period, projects developed decisions-aids for each of these systems that are intuitive and graphical, but faithful to the relatively complex multivariate nonlinear stochastic models that have established their worth by fitting data generated by these systems. These decision aids brought these multiple-year projects to reasonable foci, my intended goal.

GWU — Research Professor of Mathematics 1989-1990

I held a position as Research Professor of Mathematics at The George Washington University (GWU) for one year before deciding to continue my projects on a full time basis on my own.

NRC-NPS — Senior Research Associate 1989-1989

I won a second one-year Senior Research Associateship from the National Research Council (NRC) of the National Academies of Sciences and Engineering, taken at Naval Ocean Systems Center (NOSC), San Diego, CA, beginning 3 July 1989. My successful research proposal was, “Statistical Mechanics of Mesoscopic Information Processing in C^3 and Neocortical Systems.” I accepted this award for three months to extend my work in combat analyses.

From 1989-1991, I was a ranking member, 7th Dan (Master level) black belt in Shotokan karate, and Director of Scientific Studies, one of three executive directors, of the American JKA Karate Association (AJKA), an international federation of over 100 karate organizations.

NPS — Professor of Physics 1986-1989

On 1 August 1986, I was appointed Full Professor of Physics at the Naval Postgraduate School, Monterey, CA, with a joint appointment to the C³ (Command, Control & Communications) Academic Group.

My research focused on application of statistical mechanics to large-scale systems, specifically in neuroscience and modeling of combat-simulation systems. This research also directly involved directing thesis officer-students. I taught officer-students various physics subjects, including: mechanics, statistical physics, mathematical physics, and Combat Simulation Analysis (a physics course I created at NPS). Class sizes ranged from 15 to 30 students. I also regularly taught extra reading courses, composed of one or two students each, in advanced statistical physics and advanced stochastic physics. I served on the Physics curriculum committee and as Chairman of the Combat Analysis Sequence, a new sequence of eight courses.

During this period, I led an excellent team of military officers and civilians to accomplish my goals, helping most of my thesis students to win awards for their contributions.

On 25 March 1988, after several panels of technical and managerial review, I was officially notified that I was selected as Assistant Director Washington Operations, Joint Tactical C³ Agency (JTC3A), a Senior Executive Service (SES) position, and that I would have to begin this new appointment immediately. However, I had worked for three years to carve out an approach to realistically baseline combat models to field data, had obtained funding for a civilian-military team from the Deputy Under Secretary of the Army for Operations Research, and (correctly) estimated that we needed a few more months to bring this project to some focus, as I did at CAA from February through June 1989 until the end of my contract with NPS.

NRC-NPS — Senior Research Associate 1985-1986

In August 1985 I received a one-year award as a Senior Research Associate from the National Research Council of the National Academies of Sciences and Engineering, tenured at NPS, to pursue my research into applications of my published methods of nonlinear nonequilibrium statistical mechanics to analyses of large-scale systems. My project was, “Applications of Nonlinear Nonequilibrium Statistical Mechanics to Options Planning.”

PSI — President 1970-1986

Physical Studies Institute (PSI) was a 501(c)(3) nonprofit scientific and educational California corporation I founded in 1970 and kept in operation through 1991. From 1978-1985, I developed methods of nonlinear nonequilibrium statistical mechanics derived by mathematical physicists in the late 1970s, and applied these methods to specific problems in neuroscience, theoretical physics and economics. From 1980-1986, PSI was an independent agency account of the Institute for Pure and Applied Physical Sciences (IPAPS) at UC San Diego.

In 1978, I received California Certification as an Emergency Medical Technician (EMT), and volunteered my time in this capacity.

From 1970-1978 I personally funded and administrated the Institute for Study of Attention (ISA) High School, a subsidiary of PSI, developing and publishing an educational methodology emphasizing restructuring of standard text material to enhance personal learning strengths. We offered over 30 courses in academics, fine arts and physical disciplines. From 1981-1986 I helped administrate another subsidiary, Conservatory of Ballet Arts Company, consisting of over 100 students, and an active dancing group of about 30.

From 1970-1978 I worked with other ISA teachers to prepare teaching aids in the form of problem-texts in Algebra, Chemistry, Probability, and Tennis. I also taught Mathematics and Physical Science at the

ISA school.

I trained in and taught karate since 1958, at Caltech, UCSD, UCB, UCLA, SUNY SB, PSI, and NPS. I developed and published a methodology promoting the learning of attentional skills in parallel with a physics approach to the learning of traditional physical skills. From 1970-1988 I regularly taught karate through PSI, and published three textbooks in this discipline.

This period was extremely creative and fulfilling, albeit also quite challenging and difficult. I fully understood the necessity of my commitment to ideas and people to carry out these programs. I was able to use my trained mind and body effectively and artistically to help thousands of people, many on an individual basis for several years on a daily or weekly basis, reaching across many walks of life. Many of these people trained or worked with me simply to better themselves; many others required guidance and discipline to overcome adversity and personal problems; some contributed their own expertise to this organization to help others.

UCSD — Research Associate, Physics 1980-1986

I held an honorary position at UC San Diego as a Research Associate in the Institute for Pure and Applied Physical Sciences (IPAPS), a research branch of the Physics Department.

UCSD — Research Associate, Music 1972-1974

I held an honorary position as a Research Associate in the UCSD Music Department, doing research with Pauline Oliveros creating music with autonomic feedback.

UCSD — Asst. Research Physicist 1970-1972

In 1970 I left my position as Assistant Professor of Physics at the State University of New York at Stony Brook (SUNY SB), and returned to the University of California at San Diego (UCSD) to work with Keith Brueckner in theoretical nuclear physics.

I ran my first marathon with Keith, along the beach, in 2 hrs 40 mins.

In 1967 I had received my Ph.D. in theoretical physics from Keith Brueckner, the first Dean of Science and Engineering at UCSD. My thesis was entitled “One-Meson-Exchange Potentials and Properties of Nucleon-Nucleon Scattering and of Nuclear Matter.”

Three papers from 1983-1986 calculated a contribution to the binding energy of nuclear matter induced by nonlinearities of realistic momentum-dependent nucleon-nucleon interactions, using methods developed by the author in the early '60's. These effects are large enough to possibly finally bring theory and experiment into agreement, but a much more detailed project would be required to fully test this conjecture.

SUNYSB — Asst. Professor 1969-1970

I was an Assistant Professor in the Physics Department at the State University of New York (SUNY) at Stony Brook, developing my thesis work in theoretical nuclear physics. During this time I also performed research with the Psychology Department, working with Les Fehmi on behavioral correlates of control of EEG.

UCB & UCLA — NSF Postdoctoral Fellow 1967-1968

I won a two-year National Science Foundation (NSF) Postdoctoral Fellowship to develop my thesis work in theoretical nuclear physics. I spent the first year with the Physics Department at UC Berkeley, and the second year with the Physics Department at UC Los Angeles.

UCSD — Graduate Student 1962-1967

Influential Professors:

Keith Brueckner: Thesis advisor, "One-Meson-Exchange Potentials and Properties of Nucleon-Nucleon Scattering and of Nuclear Matter". See summary paper https://www.ingber.com/nuclear68_forces.pdf.

Bernd Matthias: Friend and Colleague.

Maria Goeppert Mayer: Offered much encouragement and motivation to work in her discipline.

I spend most of 1964 studying at the Niels Bohr Institute in Copenhagen. In 1965-1966 I worked with friend and colleague Hal T. Yura at Rand Corporation on Collective Interactions Between Light and Matter.

Caltech — Undergraduate Student 1958-1962

In 1960-1961 I was a Reader for undergraduate Algebra. In the Summer of 1960 I worked as a Research Assistant in Metallurgy. In 1961-1962 I was a Reader for graduate course Mathematical Physics.

Karate — 1958-1970

My first instructor was Tsutomu Ohshima for a couple of years. My second instructor was Hidetaka Nishiyama for over 10 years, from whom I received my 3rd Dan Black Belt and my Sensei/Instructor's training and degree in 1969, becoming the first Westerner to receive the Sensei/Instructor's degree from the Japan Karate Association (JKA) and the All America Karate Federation (AAKF).

Publications

Some of my publications are listed on:

<https://www.ingber.com/ingber.bib.html>
<https://authors.repec.org/pro/pin1/>
<https://orcid.org/0000-0003-1502-3910>
<https://researcherid.com/rid/C-3211-2018>
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- L. Ingber, *Elements of Advanced Karate* (Ohara, Burbank, CA, 1985). [ISBN 0-89750-127-6. URL https://www.ingber.com/karate85_book.html]
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- L. Ingber, "Statistical mechanics of nonlinear nonequilibrium financial markets," *Mathematical Modelling* **5** (6), 343-361 (1984). [URL https://www.ingber.com/markets84_statmech.pdf]
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- L. Ingber, "The OXY cornerstone," in *Legends of Caltech*, edited by W.A. Dodge, Jr., R.B. Moulton, H.W. Sigworth, and A.C. Smith, Jr. (Alumni Association, California Institute of Technology, Pasadena, CA, 1982), p. 28. [ISBN 0-215-12345-X. URL https://www.ingber.com/ingber82_LegendsOfCaltech.pdf]
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- L. Ingber, *The Karate Instructor's Handbook* (Physical Studies Institute Inc.-Institute for the Study of Attention, Solana Beach, CA, 1976). [URL https://www.ingber.com/karate76_book.html]
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- S. Bryant, L. Ingber, and M. Marians, "Activities in Probability," Book No. AP-74, Physical Studies Institute Inc., Solana Beach, CA, (1974).
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- L. Ingber, "Editorial: Learning to learn," *Explore* **7**, 5-8 (1972). [URL https://www.ingber.com/smni72_learning.pdf]
- J.R. Buchler and L. Ingber, "Properties of the neutron gas and applications to neutron stars," *Nuclear Physics A* **170**, 1-11 (1971).
- L. Ingber and R. Potenza, "Nuclear forces and nuclear energetics," *Physical Review C* **1**, 112-122 (1970).
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- L. Ingber, "Physics of karate techniques," Instructor's Thesis, Japan Karate Association, Tokyo, Japan, (1968).
- K.A. Brueckner and L. Ingber, "Nuclear Forces," *Journal of the Physical Society of Japan* **S24**, 616 (1968).
- L. Ingber, "Realistic nuclear forces," *Reviews Modern Physics* **39**, 648 (1967).
- L. Ingber, "One-meson-exchange potentials and properties of nucleon-nucleon scattering and of nuclear matter," Ph.D. Thesis, UC San Diego, La Jolla, CA, (1967). [URL https://www.ingber.com/nuclear67_ThesisPhD.pdf]
- L. Ingber, "Collective interactions between light and matter," Report 1966:CIBLM, RAND, Santa Monica, CA, (1966).
- L. Ingber, "Non-adiabatic corrections to the method of stationary states," *Physical Review A* **139**, 35-39 (1965). [URL https://www.ingber.com/nuclear65_nonadiabatic.pdf]
- L. Ingber, "Velocity-dependent potentials," *American Physical Society Bulletin* **10**, 737 (1965).
- L. Ingber, "Electroluminescence," Report 1957:BTSHS, Brooklyn Technical High School, Brooklyn, NY, (1957). [Award, American Physical Society]

Teaching

Caltech, UCSD, UCB, Stanford, UCLA, SUNY SB, PSI, NPS 1960-1988

Founded and Instructed Karate Classes and Clubs

Caltech 1960-1962

Reader, Modern Algebra

Reader, Methods of Mathematical Physics, Graduate Course

Caltech Alumni Advisors Network 2018-

Advisor, <https://alumniadvisors.caltech.edu>

UC Berkeley 1967

Advanced Quantum Mechanics, Graduate Course

SUNY Stony Brook 1969-1970

Freshman and Sophomore Physics

Methods of Mathematical Physics, Graduate Course

UC San Diego 1970-1972

Natural Science

UC San Diego Extension 1972-1973

Application of Karate to Physics and Attention

Developing Intuition for Physics

UC San Diego Summer Session 1973-1976

Concepts in Physics

ISA Alternative School 1972-1978

Physical Sciences, Mathematics, Karate, T'ai Chi

Naval Postgraduate School (NPS) 1986-1989

Advanced Statistical Physics, reading course

Advanced Stochastic Physics, reading course

Combat Simulation Analysis

Mechanics

Path Integrals, reading course

Special Assistance Lectures

Statistical Mechanical Computations, reading course

Statistical Physics

Theoretical Physics

Theses, M.S. (7)

Guru Nanak Dev University (India) 2012-

Thesis, Ph.D. (1)

Thapar University (India) 2021-

Thesis, Ph.D. (1)

Reviewing

Some of my reviews are listed on:

<https://publons.com/researcher/708022/lester-ingber/>

<http://www.reviewerpage.com/Lester-Ingber>

Editor/Reviewer/Advisor for Technical Papers

Acta Scientific Computer Sciences, Editorial Board 2019-2020
 American JKA Karate Associations (AJKA), Director Scientific Studies 1989-1991
 Future Physics (mdpi.com), Editor 2018
 International Conference on Advancements in Communication and Computational Technologies (ICACCT-2021), Advisory Committee 2021
 International Conference on Intelligent Systems and Smart Technologies I2STâ23 (i2st.org), Member of Technical Committee 2022
 International Journal of Applied Intelligence 1994-
 International Journal of Artificial Intelligence, Editorial Board 1994-2017
 International Journal of Applied Mathematics, Computational Science and Systems Engineering, Editor-in-Chief 1 Jun 2021 - 1 Jan 2022
 International Journal of Classical & Modern Physics (IJCMP), Editorial Board 2022-
 International Journal of Science, Technology and Management, Editorial Board 2010-2017
 ISCI Physical Sciences and Engineering, Editorial Board 2019-
 Journal of Autonomous Intelligence, Editorial Board 2023-
 Journal of Entrepreneurship and Business Innovation (JEBI), Editorial Board 2014-
 LinkedIn, Career Advisor 2018-
 Nature (Springer), Editor 2022-
 Physics (mdpi.com), Editor 2018-
 Preprints.org (mdpi.com), Advisory Board 2019-
 Preprints.org (mdpi.com), Topic Editor, Quantum Computing 2020-
 Publons, Mentor 2020-
 Quantum Reports (mdpi.com), Editorial Board 2019-2022
 Quantum Reports, Guest Editor, Special Issue: Quantum Aspects of Physiology 2019
 Research Publisher, Editor-in-Chief Current Progress Journal and e-conferences 2012
 Research Publisher, Editor-in-Chief Graduate Journal of Research and e-conferences 2012
 Research Publisher, Editor-in-Chief Undergraduate Journal of Research and e-conferences 2012
 Samalkha Group of Institutions (SGI) Int'l J. Science, Tech. & Manag., Editorial Board 2010-2012
 Sci (mdpi.com), Advisory Board 2018-
 TechCastGlobal, Expert 2006-2024
 The International Alliance for Shotokan Karate (IASK), Officer 2018-2019
 The Open Cybernetics and Systemics Journal, Editorial Board 2007-2018
 Virtual Economics, Editorial Board 2020-
 Virtual Economics, Conference 2021, Scientific & Organizing Committee

Reviewer for Technical Papers

Abstract and Applied Analysis 2013-
 Algorithms (mdpi.com) 2018-
 American Physical Society (aps.org) "Outstanding Referee" 1966-
 Applied Soft Computing 2013-
 Artificial Intelligence Evolution 2019-
 Athens Institute for Education and Research 2016-
 Athens Journal of Sciences 2016-
 Axioms (mdpi.com) 2018-
 Behavioral and Brain Sciences 1994-
 Bio Accent Journal (BOAJ) General Physics 2016-
 Brain Research Bulletin 2011-
 Brain Sciences (mdpi.com) 2016-

Clinical Neurophysiology 2002-
 Computational Intelligence and Security (CIS'07) 2007
 Computational Optimization and Applications 1994
 Computational Statistics 2011-
 Computer 1991-
 ConradChallenge.org Judge 2018
 Control and Cybernetics 1995-
 Electronics (mdpi.com) 2021-
 Encyclopedia of Artificial Intelligence 2007-
 Energies (mdpi.com) 2019-
 Entropy (mdpi.com) 2017-
 European Journal of Finance 2006-
 European Research Council 2012-
 European Science Foundation (ESP) College of Expert Reviewers 2018-
 Forecasting Volatility in Financial Markets (CIEF'2005) 2005
 Fractal and Fractional (mdpi.com) 2017-
 IEEE/ACM Transactions on Computational Biology and Bioinformatics 2019-
 IEEE Intelligent Systems 2019-
 IEEE Security & Privacy 2015
 IEEE Transactions on Knowledge and Data 2019-
 Institute of Electrical and Electronics Engineers (IEEE) 1992-
 Institute of Physics (IOP) Publishing 2020-
 International Conference on Neural Information Processing (ICONIP) 1996
 International Journal of Applied Cryptography 2010-
 International Journal of Psychophysiology 2014-
 International Multiconference on Engineering and Technological Innovation (IMETI) 2008-
 International Symposium on Academic Globalization 2010-
 Journal of AIDS and HIV Research 2013-
 Journal of Computational Chemistry 1995-
 Journal of Engineering Science and Technology (JESTEC) 2010-
 Journal of Neuroscience Methods 2012-
 Journal of Nonlinear Science 2001-
 Journal of Optimization and Applications (JOTA), 2022-
 Journal of Statistical Computation and Simulation 2006-
 Maejo International Journal of Science and Technology 2011-
 Mathematical and Computer Modelling 1989-
 Mathematics (mdpi.com) 2018-
 Medical Research Archives 2015-
 Medical Science Monitor 2004-
 Neural Networks 1996-
 Neural Regeneration Research 2012-
 Neuropsychiatric Disease and Treatment 2017-
 NeuroQuantology Journal 2008-2018
 Optical Engineering 2010-
 Pathophysiology (mdpi.com) 2021-
 Physical Review and Physical Review Letters (aps.org) "Outstanding Referee" 1966-
 Psychophysiology 1994
 Scholarpedia.org 2006-
 Sciences of Electronics, Technologies of Information and Telecommunications 2016-
 Sensors (mdpi.com) 2015-
 Sports (mdpi.com) 2018-
 The 6th International Conference on Biomedical Engineering and Biotechnology (ICBEB) 2017
 Society for Industrial and Applied Mathematics (SIAM) 1995-
 SPG BioMed 2019-

Statistics and Computing 1992-1993
 Symmetry (mdpi.com) 2018-
 Systemics, Cybernetics and Informatics Conferences 2009-
 TargetMeeting, Chair and Presenter, Cellular & Molecular Neuroscience-III, 18 June 2013
 Webmed Central, Scholarly Reviewer, 2012-
 Workshop on Physics of Computation 1993-1994
 World Multiconference on Systemics, Cybernetics and Informatics (WMSCI) 2007
 World Scientific and Engineering Academy and Society (WSEAS) 2006-

Review Panels, Associations, Consulting, Contracts/Grants

Review Panels

American Society for Engineering Education 1989-1991
 Eighth International Conference on Mathematical and Computer Modelling 1-4 April 1991
 Chair, *Statistical Physics Modelling of Nonlinear Stochastic Systems*
 Frontier Science in EEG Symposium: Continuous Waveform Analysis
 October 9 1993, New Orleans LA
 Joint Directors of Laboratories (JDL) 1986-1989
 Naval Postgraduate School (NPS) 1986-1989
 Member, Command, Control and Communications (C³) Group
 Technical Panel on Command, Control and Communications (C³), Basic Research Group
 Naval Air Development Center 1985-1987
 Review Panel for SDI Architectures
 Workshop on Physics and Computation
 PhysComp '94, This Decade and Beyond
 November 17-20 1994, Dallas TX

Associations/Consulting

American Institute of Physics (AIP.org) 1962-
 American Mensa (lester.ingber@member.mensa.org) 2008-
 American Physical Society (APS.org) 1962-
 ANSER, Arlington VA, Consultant C³ SDI 1986-1988
 Brooklyn Tech Alumni Foundation (bthsalumni.org) 1958-
 Brooklyn Technical High School LinkedIn Group, Founder, Manager 2008-2014
 Caltech Alumni Association (alumni.caltech.edu) 1962-
 Community Emergency Response Team/CERT (ashlandcert.org) 2006-2018
 Gerson Lehrman Group (GLG.it), Consultant 2008-
 Global Association of Risk Professionals (GARP.com) 1999-
 GARP Blockchain Risk Research Group, Steering Committee 2016
 Institute of Physics (IOP.org) 2012-
 Institute of Electrical and Electronics Engineers (IEEE.org) 2012-
 Intellectual Ventures (intven.com), Consultant 2007
 Kolabtree (www.kolabtree.com/find-an-expert/lester-ingber1/), Consultant 2015-
 Lifeboat, Scientific Advisory Boards: Complex Systems, Economics, Human Trajectories, Information
 Sciences, Neuroscience, Physics lifeboat.com/ex/bios.lester.ingber 2012-
 LinkedIn www.linkedin.com/in/ingber 2005-
 Maven.co, Consultant 2010-
 "Future of Money 2017"
 NeuroroboticsMagazine.com, Advisor 2017-2018
 Professional Risk Managers' International Association (PRMIA.org) 2001-2018
 PRMIA Subject Matter Expert (SME) Advisory Group 2013-2018
 RAND, Santa Monica CA, Consultant 1965-1966

Scholarpedia (Scholarpedia.org) 2006-
 Sea Panel (seapanel.com) Board of Directors 2010-2012
 TechCastGlobal (techcastglobal.com), Expert 2006-2024
 Thomson Reuters Expert Witness Services (RoundTableGroup.com) 1996-
 UC San Diego Alumni (alumni.ucsd.edu) 1967-
 Wikistrat.com, Expert 2016-2016
 “Blockchain Meets Insurance 2016”

Contracts/Grants

Principal Investigator, Army Contract RLF6L, 1988-1989

“Mathematical Comparison of Computer Models to Exercise Data: Comparison of JANUS(T) to National Training Center Data”

subcontracts:

UC Lawrence Livermore National Laboratory (2)

BDM (1)

TRAC-MNTRY Army officers (3)

Principal Investigator, National Science Foundation (NSF) Pittsburgh Supercomputing Center (PSC) Grant DMS940009P, 1994-1995

“Porting Adaptive Simulated Annealing and Path Integral Calculations to the Cray; Parallelizing ASA and PATHINT Project (PAPP)”

selected (8) internet volunteers from many applicants

“Hybrid classical-quantum computing: Applications to statistical mechanics of neocortical interactions”

Principal Investigator, State University New York Stony Brook (SUNY SB) Ookami supercomputer, Apr 2021 -

Principal Investigator, The Extreme Science and Engineering Discovery Environment (XSEDE), Grant MCB140110, 20 Feb 2013 - Dec 31 2021

20 Feb 2013 - 30 Jun 2015: “Electroencephalographic field influence on calcium momentum waves”

1 Jul 2015 - 31 Dec 2017: “Quantum path-integral qPATHTREE and qPATHINT algorithm”

1 Jan 2018 - 30 Jun 2020: “Quantum Path-Integral qPATHINT Algorithm”

1 Jul 2020 - 30 Jun 2021: “Affective Modulation of Information Processing During Attention Tasks”

Honors and Awards

Brooklyn Technical High School

Chief Justice, Student Court 1955-1958

American Institute of Physics Special Award for paper, "Electroluminescence" 1957

Honorable Mention, New York Science Exam 1957

New York State Merit Scholar 1957

Caltech

Kelman Scholar 1958-1962

Captain, Karate Club 1960-1962

Sigma Pi Sigma, Physics Honor Society 1961-

Sigma Pi Sigma, Adopt-a-Physicist Program 2016-

Sigma Xi, Scientific Research Society 1963-

UC San Diego

President, Organization of Organizations 1965

Chancellor's advisory committee of student organization officers

Research Associate, Honorary Researcher

Music Department 1972-1974

Institute Pure & Applied Physical Sciences 1980-1986

National Science Foundation (NSF), Postdoctoral Fellow

UC Berkeley 1967-1968

UC Berkeley 1968-1969

Japan Karate Association (JKA) & All America Karate Federation

First Westerner to receive Instructor's degree 1968

National Research Council (NRC), Senior Research Associate

Naval Postgraduate School (NPS) 1985-1986

Naval Ocean Systems Center (NOSC) 1989

U.S. Senior Executive Service (SES) 1988

Selected as JTC3A/DCA Asst. Director Washington Operations (declined)

Mensa 2008-

Facebook HighIQWorld (closed group) 2013-

Clearances

SECRET

RAND/U.S. Air Force, 1965-1966

National Academy of Sciences, 1986-1987, 3 July 1989 - 6 October 1989

SAIC, 1 February 1990 - 7 June 1990

TOP SECRET/NATO/CNWDI

NPS, 4 May 1987 - 30 June 1989

TOP SECRET/Special Compartmented Information (TS/SCI)

NPS, 22 January 1988 - 6 July 1989