

Lester Ingber

Physicist with interdisciplinary expertise and interests <ingber at alumni.caltech.edu> [29K+]
ingber@alumni.caltech.edu

Summary

<http://www.linkedin.com/in/ingber> has 29,000+ Direct (Degree 1) Connections.

To Connect with me, use the standard LinkedIn protocol, or use this quick link:

<http://url.ingber.com/linkedin>

Since 1965, I have published over 100 papers and books in the disciplines of: theoretical nuclear physics, neuroscience, finance, general optimization, combat analysis, karate, and education.

<http://www.ingber.com> contains papers and code on topics:

ASA: Adaptive Simulated Annealing, Optimization, Importance Sampling, Nonlinear Systems, Stochastic Systems.

COMBAT: Statistical Mechanics of Combat and Simulations.

KARATE: The Art and Science of Karate, Applications to Learning.

MARKETS: Statistical Mechanics of Financial Markets, Options, Risk, Portfolios, Trading.

NEOCORTEX: Statistical Mechanics of Neocortical Interactions, Applications to Memory, EEG, Intelligent Systems.

NUCLEAR: Nucleons, Nuclear Matter, Riemannian Interactions.

PATH-INTEGRAL: Path Integrals in Stochastic Systems with Nonlinear Diffusion.

More information is at the LinkedIn LIR Products page

<http://www.linkedin.com/company/lester-ingber-research-lir-/products>

Specialties

My projects have been in theoretical nuclear physics, statistical mechanics of neocortical interactions (short-term memory and EEG correlates, AI), statistical mechanics of combat (baselining simulations to training), and statistical mechanics of financial markets (options, bond futures, risk management, and trading systems).

I have developed algorithms for nonlinear stochastic systems, including ASA/VFSR & PATHINT/PATHTREE, a full suite of options code, and copula risk management.

Experience

Partner at Pion Capital

June 2011 - Present (8 months)

Pion Capital is 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 am working on various administrative and R&D projects.

Physicist at Lester Ingber Research (LIR)

1989 - Present (23 years)

See the LIR page <http://www.linkedin.com/company/lester-ingber-research-lir-/products>

I have worked through LIR intermittently between various positions in academia, government and business, as described in http://www.ingber.com/ingber_CV.pdf .

Some recent work includes:

My Statistical Mechanics of Neocortical Interactions (SMNI) work since 1981 has detailed short-term memory and local generators of EEG. In a Mathematical Biosciences 2010 publication, http://www.ingber.com/smni10_multiple_scales.pdf , PATHINT was used to evolve probability distributions of columnar activity with explicit oscillatory firings, and integrate such mesoscopic processes with global brain EEG activity. "Columnar electromagnetic influences on short-term memory at multiple scales" is in http://www.ingber.com/smni11_stm_scales.pdf .

Ideas by Statistical Mechanics (ISM), http://www.ingber.com/smni06_ism.pdf , is a generic program to model evolution and propagation of ideas/patterns throughout populations subjected to endogenous and exogenous interactions, published in Encyclopedia of Artificial Intelligence (2008), and J Integrated Systems Design and Process Science, Special Issue: Biologically Inspired Computing (2007).

Tools have been developed to price complex projects as financial options with alternative schedules and strategies, in Real Options for Project Schedules (ROPS), http://www.ingber.com/markets07_rops.pdf , published in invited paper in International J. Science, Technology & Management (2010). Risk management codes have been developed in Trading in Risk Dimensions (TRD) in http://www.ingber.com/markets_trd.pdf , published in Handbook of Trading, McGraw-Hill (2010).

4 recommendations available upon request

Director R&D at DUNN Capital Management

January 2002 - July 2003 (1 year 7 months)

I developed copula risk-management algorithms, and helped with analysis of other trading-related projects.

1 recommendation available upon request

Director R&D at DRW Trading

1997 - December 2001 (4 years)

I led teams developing multi-factor nonlinear stochastic models of markets, directly applied to options, bond futures, and various trading systems.

I formulated "volatility of volatility" of markets and, using Eurodollars as an example, I developed PATHINT to explicitly calculate all Greeks for options, based on my 2-variable price-volatility model.

Research Professor of Mathematics at George Washington University (GWU)

1989 - 1990 (1 year)

Research

Professor of Physics at US Army Concepts Analysis Agency (CAA)

1989 - 1989 (less than a year)

Research

Senior Research Associate at National Research Council (NRC)

1989 - 1989 (less than a year)

Research

Professor of Physics at Naval Postgraduate School (NPS)

1986 - 1989 (3 years)

http://www.ingber.com/combat93_c3sci.pdf summarizes a series of papers started in 1985, which led to the baselining of JANUS(T) simulation to National Training Center (NTC) data. I was Principal Investigator (PI) of an Army contract, leading a team of scientists and officers to develop mathematical comparisons of Janus computer combat simulations with exercise data from NTC, developing a testable theory of combat successfully baselined to empirical data.

1 recommendation available upon request

Consultant at ANSER

1986 - 1988 (2 years)

Research

Senior Research Associate at National Research Council (NRC)

1985 - 1986 (1 year)

Research

Research Associate, Physics at UC San Diego (UCSD)

1980 - 1986 (6 years)

Research with Physics Department and Institute for Pure and Applied Physical Sciences (IPAPS)

1 recommendation available upon request

President at Physical Studies Institute (PSI)

1970 - 1986 (16 years)

PSI via UCSD/IPAPS agency account 1970-1986: Published research in physics, neuroscience, and finance. Paper in 1981 led to Physical Review's (premier physics journal's) first paper on the brain in 1983. Paper in 1984 led to Physical Review's first paper in finance in 1990.

Institute for Study of Attention (ISA) (educational branch of PSI) alternative school 1970-1978: Founded, funded, directed, instructed, and managed instructors in over 30 courses (see "Attention, physics and teaching," http://www.ingber.com/smni81_attention.pdf). ISA karate classes 1970-1986: Instructed thousands of students and wrote three karate texts.

Conservatory of Ballet Arts Company (CBAC) from 1976-1985 was another branch of PSI directed by Louise Ingber (<http://louise.ingber.com>).

Research Associate, Music at UC San Diego (UCSD)

1972 - 1974 (2 years)

Research with Music Department with Pauline Oliveros

Director Learning To Learn at UC San Diego (UCSD) Extension

1973 - 1973 (less than a year)

See "Editorial: Learning to learn," http://www.ingber.com/smni72_learning.pdf

Asst Professor of Physics at State University of New York (SUNY) at Stony Brook

1969 - 1970 (1 year)

Research and Teaching

National Science Foundation Postdoc Fellow at UC Los Angeles (UCLA)

1968 - 1969 (1 year)

Research

Sensei at Japan Karate Association (JKA)/All America Karate Federation (AAKF)

January 1968 - December 1968 (1 year)

I was the first graduate of the Japan Karate Association (JKA)/All America Karate Federation (AAKF) Sensei/Instructor's School, taught by Hidetaka Nishiyama in 1968. My thesis was Physics of Karate Techniques.

National Science Foundation Postdoc Fellow at UC Berkeley (UCB)

1967 - 1968 (1 year)

Research

Consultant at RAND Corporation

1965 - 1966 (1 year)

I worked with friend and colleague Hal T. Yura on Collective Interactions Between Light and Matter.

Reader, Mathematical Physics (graduate level) at California Institute of Technology (Caltech)

1961 - 1962 (1 year)

I graded homeworks and exams.

Research Assistant Metallurgy at California Institute of Technology (Caltech)

1960 - 1961 (1 year)

I conducted experiments in metallurgy.

Reader, Algebra (undergraduate level) at California Institute of Technology (Caltech)

1960 - 1961 (1 year)

I graded homeworks and exams.

Projects

How I Think

January 1943 to Present

Members: Lester Ingber

Every since I got my skull cracked open by a spoon during an argument over a red truck when I was about two years old, I've had problems holding on to chains of thought. I quickly learned to compensate by "thinking" in overlapping patterns, so that whenever such a lapse occurs, I just about always can quickly reconstruct my chain of thought. At a certain age, like mine at 70, these are often described as "senior moments," but I have had these moments all my life. I think this has turned into a asset, making me very creative in all my endeavors, as I uncover new patterns of information relying on such processes more than most people do, instead of having to be led by logic.

Skills

Computational Physics

Mathematical Modeling

Interdisciplinary

Publications

<http://www.ingber.com/ingber.ref.html>

Authors: Lester Ingber

Over 100 publications in several formats, including several disciplines:

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<http://www.ingber.com/ingber.ref.html>

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Approximate conversions:

<http://www.ingber.com/ingber.end>

<http://www.ingber.com/ingber.ris>

<http://www.ingber.com/ingber.xml>

Adaptive Simulated Annealing (ASA)

Lester Ingber Research 1989

Authors: Lester Ingber

I maintain and update my ASA code, originally Very Fast Simulated Reannealing (VFSR) until 1993, available at no charge from my archive <http://www.ingber.com> (mirrored at <http://alumni.caltech.edu/~ingber>). Mirrors of the ASA code are at <http://asa-caltech.sourceforge.net> and <https://code.google.com/p/adaptive-simulated-annealing>.

Karate Texts and Videos

Lester Ingber 1982

Authors: Lester Ingber

<http://www.youtube.com/user/ingber#p/p> has videos of a series of karate seminars that developed

material for my book Elements of Advanced Karate http://www.ingber.com/karate85_book.html . I have two other books there as well, The Karate Instructor's Handbook http://www.ingber.com/karate76_book.html and Karate: Kinematics and Dynamics http://www.ingber.com/karate81_book.html , together with a running karate correspondence on <http://www.ingber.com/karate.html> .

Extended Reviews

2010

Authors: Lester Ingber

In addition to being a reviewer for 40+ scientific journals, sometimes I do extended reviews, e.g., working with colleagues who are writing books. Some recent books containing acknowledgments for such collaboration are:

Paul L. Nunez, "Brain, Mind, and the Structure of Reality" (Oxford U Press, London, 2010).

Emeric Arus, "Martial Arts Biomechanics: A Scientific Compendium of Human Movement and the Mechanical Principles of Martial Arts" (to be published).

Papers In Preparation

2011

Authors: Lester Ingber

Simulated Annealing, Volumes 1 and 2, edited by L. Ingber (InTech, Croatia, 2012). [Invited Editor.] I will include my own paper, "Adaptive Simulated Annealing Applied to High-Frequency Trading."

P.L. Nunez, R. Srinivasan, and L. Ingber, "Theoretical and experimental electrophysiology in human neocortex: Multiscale correlates of conscious experience," in Multiscale Analysis and Nonlinear Dynamics, edited by M. Pesenson (Wiley, New York, 2012), p. (In Preparation).

Education

University of California, San Diego

PhD, Theoretical Nuclear Physics, 1962 - 1966

Activities and Societies: President, Organization Of Organizations.

Founder, Karate Club/Classes. Karate Instructor: Hidetaka Nishiyama.

Niels Bohr Institute

Nuclear Physics, 1964 - 1964

California Institute of Technology

B.S., Physics, 1958 - 1962

Activities and Societies: Kelman Scholar, 4 years.

Captain, Caltech Karate Club. Karate Instructors: Tsutomu Ohshima and Hidetaka Nishiyama.

Brooklyn Technical High School (BTHS)

Diploma, college prep, 1954 - 1958

Activities and Societies: Chief Justice, Student Court.

Senior Project: Electroluminescence, special award from American Institute of Physics.

I am the Manager of the Brooklyn Technical High School LinkedIn Group, for alumni and friends of BTHS. Go to <http://www.linkedin.com/e/gis/53791> to join.

Honors and Awards

Brooklyn Technical HS 1955-1958: Justice -> Chief Justice, Student Court.

Honorable Mention, New York Science Exam 1957.

New York State Merit Scholar 1958.

Caltech, Kelman Scholar 1958-1962.

Sigma Pi Sigma, Physics Honor Society 1961-.

Sigma Xi, Scientific Research Society 1963-.

UCSD, President, Organization of Organizations 1965.

Security Clearances: Secret -> Top Secret/SCI/CNWDI 1965-1966, 1986-1990.

National Science Foundation (NSF), Postdoctoral Fellow, UCB & UCLA 1967-1969.

Japan Karate Association (JKA), First Westerner to receive Instructor's degree, Thesis: Physics of Karate Techniques 1968.

UCSD Honorary Researcher: Music Department 1972-1974.

National Research Council (NRC), Senior Research Assoc, NPS & NOSC 1985-1986 & 1989.

U.S. Senior Executive Service (SES) 1988; Selected as JTC3A/DCA Asst Director (declined).

Mensa 2008-.

Interests

100+ publications ->

ASA: Adaptive Simulated Annealing, Optimization.

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Reviewer, Scientific Journals (40+)

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7 people have recommended Lester

"I first met Lester in 1989 while I was on the Neurology faculty at the University of South Alabama and was in San Diego as Senior Research Fellow for the Office for Naval Research. We have had many meetings since that time with stimulating conversations, mostly regarding theoretical neuroscience. I have read many of his papers and assimilated their concepts into my global view of brain function. Lester is cutting edge in his thinking and ability to translate ideas into working models with results that correlate with experimental results in the real world under a variety of perturbed conditions. I give him the highest recommendation for any collaborative project."

— **Ken Pilgreen**, *Senior Scientist and Neurologist, Jacksonville Neuroscience*, worked with Lester at Lester Ingber Research (LIR)

"Mr Ingber (AKA "Ingber Sensei") broke new ground in several areas of Karate study internationally. His work has inspired many of us over the years. Additionally, I have an appreciation for his work in the financial field, having myself worked in the financial industry for nearly 20 years. He is truly a wealth of knowledge."

— **Jon Keeling**, *Chief Instructor, JKA of Silicon Valley*, was with another company when working with Lester at Lester Ingber Research (LIR)

"Dr. Lester Ingber is a pioneer in a branch of science called "econophysics", which deals with linking statistical mechanics and financial markets. His theory is widely respected and cited in the literature. In 2001 I was a guest editor for the IEEE Transactions on Neural Networks, a special issue on Neural Networks in Financial Engineering. I invited Lester to submit and publish a research paper in the issue, which ultimately contained a compilation of the best research in this area of computational modeling of financial markets. Lester has written an excellent article, and it was a valuable contribution to the special issue."

— **Amir Atiya**, was Lester's client

"Lester and I both have physical science backgrounds, but independently became interested in the neurosciences in the 1970s. Lester is one of the smartest guys I know; his contributions to theoretical neuroscience creatively employ modern methods of statistical physics to brain dynamics. Lester is fun to work with. I am a secondary author on several of his papers, and he contributed a very innovated chapter to my 1995 book, *Neocortical Dynamics and Human EEG*

Rhythms."

— **Paul L. Nunez, Ph.D.**, *Professor and Director, Department of Biomedical Engineering, Tulane University, Brain Physics Group*, worked with Lester at Lester Ingber Research (LIR)

"Lester always brings a superb combination of pure intellect, inventiveness and quiet good humor to the office. His knowledge of math, statistics, modeling and capital markets is unmatched in my experience. As a person who is naturally respected by his colleagues, he is both a great leader and professional partner."

— **James Cypher**, *Director of Sales and Marketing, DUNN CAPITAL MANAGEMENT, LLC*, worked with Lester at DUNN Capital Management

"Lester Ingber has a "pure intelligence" unfettered by artificial boundaries between important disciplines, both theoretical and applied. His tremendous creativity and intellect are truly outside the box, hence productive and useful in multiple and diverse areas of application. Lester and I were close colleagues at the Naval Postgraduate School, had many deep and intense scientific discussions, and shared many intellectual and academic interests. Hence, when I give him my highest recommendation, it's from a basis of a deep appreciation and knowledge of his truly unique understanding and intense involvement in physics, mathematics, markets, and combat modeling."

— **Edward B. Rockower**, *Assoc. Professor, Operations Research, The Naval Postgraduate School*, worked with Lester at Naval Postgraduate School (NPS)

"A brilliant researcher, Lester Ingber illuminated the study of attention for me when I studied Karate with him in the 1970s. I got a taste of physics from his way of explaining Karate moves in terms of mass, energy and momentum. Lester's books and papers and his web site are rich resources for the community of interdisciplinary scientists. Lester's contributions are informed by the disciplines of Karate, mathematics and theoretical physics. He is a formidable leader influencing many over the years without the benefits and/or restrictions of an institutional base. I highly value the years that we shared ideas that were and are important to me in my music."

— **Pauline Oliveros**, *Professor of Music, UC San Diego (UCSD)*, worked directly with Lester at UC San Diego (UCSD)

[Contact Lester on LinkedIn](#)