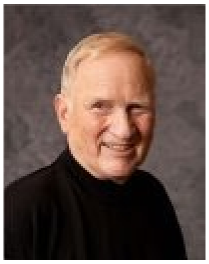
John F. Clauser - CV



Contact Information:

817 Hawthorne Drive, Walnut Creek, CA 94596-6112, USA
Ph: (1) 925-939-9885, email: john@jfcbat.com

Birthplace:

Born Pasadena, CA, USA, 1 December 1942

Education:

1960 Baltimore Polytechnic Institute, High School Diploma, Adv. College Prep.
1964 Caltech, BS, Physics
1966 Columbia University, MA, Physics
1970 Columbia University, PhD, Physics (Research Sponsor, Patrick Thaddeus)

Employment and Research Experience:

1969–1975	Postdoctoral Research Associate, Physics Dept., Univ. of Calif.-Berkeley, and Lawrence Berkeley National Laboratory.
1975 - 1986:	Research Physicist, Lawrence Livermore National Laboratory.
1986 - 1987:	Senior Scientist, Science Applications International Corp., (SAIC, Emeryville, CA).
1988 - 1989:	Consultant, Inventor, (J. F. Clauser & Assoc., Livermore, CA).
1990 - 1997:	Research Physicist, Univ. of Calif. – Berkeley, Physics Dept.
1997 - ____:	Research Physicist, Consultant, Inventor (J.F. Clauser & Assoc., Walnut Creek, CA).

Awards and Honors:

1982: *The Reality Foundation Prize* ($6000, shared with John S. Bell, CERN): *"The Reality Foundation Prize to John F. Clauser for experimental and theoretical research into quantum foundations, for devising variations of the Bell Inequality which subject local realistic models of nature to experimental tests, for performing experiments which decisively exclude semi-classical models of the radiation field, for carrying out experiments which establish non-locality as a general feature of objective reality."*

2010: The Wolf Foundation Prize in Physics ($100,000, Shared with Alain Aspect and Anton Zeilinger): "*The Prize Committee for Physics has unanimously decided that the 2010 Wolf Prize be jointly awarded to: John F. Clauser, J.F. Clauser & Assoc., Walnut Creek, CA, U.S.A., Alain Aspect, Institut d'Optique, Palaiseau, France, Anton Zeilinger, University of Vienna & Institute for Quantum Optics and Quantum Information, Austrian Academy of Sciences,Vienna, Austria, For their fundamental conceptual and experimental contributions to the foundations of quantum physics, specifically an increasingly sophisticated series of tests of Bell's inequalities or extensions there of using entangled quantum states.*"

2011 The Thomson Reuters Citation Laureate – Physics: ” for his tests of Bell’s Inequalities and quantum entanglement. (for Nobel Prize nomination)

Highlights of John’s career:

1959 -1960: As a high-school student, John built the world's first computer-driven "video games" to win awards at the '59 and '60 National High-school Science Fairs, the U.S. Navy "Science Cruiser" Award, and the "J. J. Chapman Memorial" Award ("Most Proficient Student in Electricity").

1965 - 1969: As a graduate student, with thesis sponsor, Patrick Thaddeus (Columbia), John made the 3rd measurement of the 2.7° cosmic microwave background radiation, and first observed interstellar Carbon-13.

1969: As a graduate student (independently of his thesis work), and with Abner Shimony and Mike Horne, (Boston Univ.) and Richard Holt (Harvard) John proposed the first experimental test of Bell's Theorem. This work introduced the Clauser-Horne-Shimony-Holt (CHSH) inequality as a constraint for hidden-variables theories, and later, for “Objective Local Theories and “Local Realism”

1971: John discovered the basic flaw in John vonNeumann’s “Informal Hidden-Variable Argument”.

1972: At the UC Berkeley Physics Dept., working with PhD student Stuart Freedman, John carried out the first experimental test of the CHSH-Bell's Theorem predictions. This was the world’s first observation of quantum entanglement, and was the first experimental observation of a violation of a Bell inequality.

1974: With Mike Horne (Stonehill College, MA), John first showed that a generalization of Bell's Theorem provides severe constraints for all local realistic theories of nature (a.k.a. objective local theories). This work introduced the Clauser-Horne (CH) inequality as the first fully general experimental requirement set by local realism. It also introduced the “CH no-enhancement assumption”, whereupon the CH inequality reduces to the CHSH inequality, and whereupon associated experimental tests also constrain local realism. Experimental tests of this inequality have finally been performed in 2013 at Univ. of Vienna and Univ. of Illinous, Urbana-Champaign.

1974: At UC Berkeley, John made the first observation of sub-Poissonian statistics for light (via a violation of the Cauchy-Schwarz inequality for classical electromagnetic fields), and thereby, for the first time, demonstrated an unambiguous particle-like character for photons.

1976: At UC Berkeley, John carried out the second published experimental test of the CHSH-Bell's Theorem prediction, thereby refuting the unpublished experimental results of a similar test by Richard Holt and Francis Pipkin (Harvard).

1976: At UC Berkeley, John carried out the first experimental measurement of the circular-polarization correlation of quantum-mechanically entangled photons.

1976: With Abner Shimony and Michael Horne, pointed out the importance of the observer’s freedom of choice (as a criticism of John Bell’s ‘*Theory of Local Beables*’).

1978: With Abner Shimony, John published the first comprehensive review of the experimental and theoretical status of the use of Bell's Theorem for testing local realism.

1975 - 1986: At Lawrence Livermore National Laboratory, with Tom Simonen and Ron Goodman, John designed and built a ruby-laser Thomson scattering plasma diagnostic to measure electron temperature in the 2XIIB magnetic mirror (controlled fusion) experiment. With Grant Logan, he designed and built Langmuir probe arrays to measure the spatial distribution of plasma elecron and ion temperatures and plasma potential in 2XIIB. With Eric Silver and UC Davis PhD student, Bruce Failor, he designed and built x-ray spectrometers and x-ray cameras for the analysis of relativistic *Bremstrahlung* x-ray emission from the TMX-U tandem magnetic mirror experiment.

1975 - 1986: At Lawrence Livermore National Laboratory, as Group Leader for the 2XIIB experiment, John first experimentally demonstrated the scaling limitations imposed by the drift-cyclotron-loss-cone plasma micro-instability in minimum-B magnetic mirror machines.

1975 - 1986: At Lawrence Livermore National Laboratory, John discovered strong electron-temperature gradients in the 2XIIB magnetic mirror machine, parallel to a magnetic field. This discovery was totally unexpected, and was a direct refutation of the commonly believed assertion

by Lyman Spitzer (Princeton) that a plasma's electron temperature is always constant along magnetic field lines. It was also pivotal for the subsequent invention by Grant Logan and William Fowler of "electron thermal barriers" that, in turn, were used in the TMX-U experiment at LLNL. That invention subsequently earned Logan and Fowler the James Clark Maxwell Prize.
1975 - 1986: As the leader of a group of computer scientists at Lawrence Livermore National Laboratory, John and his group designed and build the TMX-U experiment's data-acquisition and analysis system.
1984 John invented and built a dramatic new design for a racing sailboat keels. Via John's work as a consultant to the St. Francis Yacht Club's America's Cup Challenge Syndicate, this keel design was implemented on their revolutionary 12-meter yacht, USA. Virtually all present-day racing sailboat keels are a direct evolution of this design concept.
1985 - 1987: At SAIC John helped develop a 3D imaging system using thermal neutrons for counter-terrorist airline checked-baggage inspection, and wrote the tomography software for this system. Then, to diminish its false-positive rate, he invented dual-energy article-gradient material-specific x-ray imaging. SAIC has subsequently adapted this latter invention for use in inspecting carry-on luggage. Both of these systems were put in use at most international airports. Following the Sept. 11, 2001 attack on the US, their use was mandated for all US international airports. They are now manufactured by Perkin Elmer.
1987 - 1991: John first proposed and patented atom interferometers, as useful ultra-sensitive sensors for inertial and gravity forces, and for petroleum prospecting and well-logging. (US Patents 4,874,942 and 4,992,656, Australian Patent # 637,654, Canadian Patent # 2,033, 341).
1988: John first proposed the use of atom interferometry, in spacecraft for the testing of general relativity.
1992: With UC-Berkeley Physics PhD student Matthias Reinsch, John first deduced the number-theoretical properties of the fractional Talbot effect for finite gratings, first calculated this effect's spectral resonance properties, and first combined the fractional Talbot effect with the Lau effect to provide a new form of lens-free ultra-short wavelength interferometer, which he named the Talbot-Lau interferometer.
1990 - 1997: At the UC - Berkeley, Physics Dept., with postdoc Shifang Li, John first used Talbot-Lau interferometry to build deBroglie-wave atom interferometers.
1990 - 1997: At the UC - Berkeley, Physics Dept., with postdoc Shifang Li, John adapted Talbot-Lau interferometry to provide the first realization of the "Heisenberg-Microscope" experiment.
1994: John first proposed the use of Talbot-Lau matter-wave interferometry with very massive particles (e.g. "small rocks and live viruses") as a probe for limits to the validity of quantum theory, as indicated in various attempts to understand the "quantum measurement problem". Anton Zeilinger's group at Univ. of Vienna has since carried out such experiments.
1996: With J. Dowling (Redstone Arsenal, AL) John first discovered that Young's N-slit interferometer can be used to find the prime factors of an integer N.
1997: John first proposed the possibility of observing a "Temporal Talbot-Effect". This effect has since been observed, and further, has been used for factoring integers.
1998: John was granted US Patent 5,812,629, "*Ultrahigh Resolution Interferometric X-ray Imaging*".
1998 As a consultant to the Jet Propulsion Laboratory's Quantum Computing Technologies Group, John evaluated the use of matter-wave interferometry in earth-orbiting satellites for surveillance and gravity imaging of the earth's surface.
1999 – present: With support from the National Cancer Institute, John has is presently involved in research at his own private lab to develop his US Patent 5,812,629 to provide a clinically useful device (for mammography). To this end, he has observed Talbot-Lau interference with x-rays, and has used it to obtain actual phase-contrast x-ray images. Recently, other workers have also (re)discovered this technique and experiments using it are in progress at various laboratories in Switzerland, Japan and the USA.

John is also an avid sailboat racer.