Curriculum Vitae

Ilan Ben-Zvi
Distinguished Scientist Emeritus, Collider-Accelerator Department, Brookhaven National Laboratory.
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Citizenship: U.S.

Fields of Specialization in Experimental Physics:

- Linear Accelerators
- Photoinjectors and photocathodes
- Advanced electron beam diagnostics for high-brightness beams
- Advanced Accelerator Concepts
- Beam Dynamics
- Free Electron Lasers
- Superconducting RF, cavities and linacs
- Energy Recovery Linacs
- Beam Cooling
- Control of cavities

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Education:

1967-1970: **Ph.D.**, Thesis: "Hyperfine Interaction of Heavy Nuclei in Highly Ionized Atoms", Weizmann Inst., Israel. Advisor: Prof. Gvirol Goldring.
1965-1967: **M.Sc.**, Nuclear Physics, Weizmann Inst., Israel.
1962-1965: **B. Sc.** (with distinction), Physics-Mathematics. Hebrew University of Jerusalem.

Membership in Professional Organizations:

- Fellow, American Physical Society.
- Fellow, American Association for the Advancement of Science
- Life Fellow, Institute of Electrical and Electronics Engineers

Honors:

Fellow American Physical Society, 1994.
Recipient IEEE NPSS 1999 Accelerator Science and Technology Award.
Recipient BNL Science and Technology Award for 2001.
Senior Member IEEE, 2003.
Free-Electron Laser Prize, 2007.
Fellow AAAS, 2007.
Recipient IEEE NPSS Merit Award, 2008
Fellow IEEE, 2009, Life Fellow 2022.
Dieter Mohl Medal, 2023.

Scientific Publications:

Over 650 publications in total, 202 in reviewed journals.
Citation index from Google Scholar:

	All	Since 2019
Citations	9446	2398
h-index	41	21
i10-index	192	43

Public Service:

1996 – 1997, initiated the archival of accelerator conference proceedings on the web, later to become known as JACoW.
1999-2002, Secretary Treasurer, APS Division of Physics of Beams.
2001-2013, International Committee on Future Accelerators, Advanced Accelerator Concepts.
2005-2009, Chair, Particle Accelerator Science and Technology Committee, IEEE/NPSS
2005-2006, member, HEPAP Subpanel on Advanced Accelerator R&D.
2005-2018, Chair, IEEE Particle Accelerator Science and Technology Award Committee
2007-2008, member, National Academies Committee for the Scientific Assessment of High-power Free-electron Laser Technology.
2008-2018, Chair, Particle Accelerator Science and Technology Doctoral Student Award committee
2008- 2014, Chair, Advanced Accelerator Concepts Prize Committee
2010- 2016 Divisional Associate Editor for PRL.

2013-2015 Member, High Energy Physics Advisory Panel, US DOE.
2013-2015 Member, Advisory Committee on TRIUMF, National Research Council Canada
2014 – 2016 Member, IEEE Marie Sklodowska-Curie Award Committee
2017, 2019 – Chair, IEEE Marie Sklodowska-Curie Award Committee
2014-2015 – Member, HEPAP Accelerator R&D Sub Panel
2014, 2015, 2016, 2017 – Chair, FLASHForward Scientific Advisory Board
2019-2020 – Member, DESY (Hamburg) Machine Advisory Committee

Other: Various APS committees.

Graduate Students, Physics Department, Stony Brook University:

- Shi Zudan (MSI, 1991)
- Wang Haipeng (MSI, 1991)
- Babzien, Marcus (MSI, 1993)
- Kusche, Karl (MSI, 1993)
- Qiu, Xu Joe (Ph.D., Studies of High Brightness Electron Beams at the ATF, 1997)
- Doyuran, Adnan (Ph.D., The High-Gain Harmonic Generation FEL Experiment, 2000)
- Xiangyun Chang (Ph.D., High-Power, High-Current Electron Guns, 2005)
- Rama Calaga (Ph.D., Linear Beam Dynamics and Ampere Class SRF Cavities @RHIC, 2006)
- Jacob Grimes (MSI, 2007)
- Gang Wang (Ph.D., Coherent Electron Cooling / Two Stream Instabilities Due to Cooling, 2008)
- Elliott Johnson (MSI, 2011)
- Liang Xue (M.Sc. 2013)
- Tianmu Xin (Ph.D. 2016, Electron Source based on Superconducting RF)
- Omer Habib (Ph.D. 2016, Funneling electron beams from GaAs photocathodes)
- Jyoti Biswas (Ph.D. 2020, Progress towards long-lifetime, high-current polarized-electron source)

Professional Experience:

2018-present: Senior Scientist Emeritus, BNL, and
BNL Professor of Physics, Stony Brook University.
2016-2018: Visiting Scientist, CERN, RF/SRF
One year spread over 3 summers, working on:

1. Double-Quarter Wave crab cavity for the LHC luminosity upgrade
2. Using digital cavity controller for precision measurements of SRF cavity performance
3. Applying fast ferroelectric tuners for RF cavities

1989-2019: Senior Physicist (tenured), Collider-Accelerator Department and Physics Department, Brookhaven National Laboratory, NY 11973,

Brookhaven Professor of Physics Stony Brook University, NY 11794
Research Projects and Management Responsibilities:

1. Chief Scientist, ATF, 2016-2018.
2. Associate Chair for Superconducting Accelerator R&D, Collider-Accelerator Department, 2005-2018.
3. Head, Accelerator R&D Division, 2009-2016.
4. Original proponent of the linac-ring eRHIC concept, assembled the team pursuing this design and led its R&D since inception.
5. Lead successfully the competitive proposal for the ATF-II upgrade and made the ATF a National User Facility.
6. Invented the highly successful Double Quarter Wave crab cavity and led it to success as the leading cavity for the HL-LHC upgrade and an essential component of eRHIC.
7. Proposed and led the funneling polarized electron gun, an R&D item towards the linac-ring eRHIC concept.
8. Participated in the initiation of the Coherent electron Cooling proof-of-principle experiment, developed the superconducting 112 MHz gun, its photocathode system and the SRF 5-cell 704 MHz used in this experiment.
9. Original proponent for bunched-beam electron cooling of RHIC
10. Past Director of the Accelerator Test Facility, a Users' Facility for Accelerator and Beam Physicists. The ATF is a high brightness linear electron accelerator and high-power laser complex, dedicated for research and development in particle accelerators and laser - electron beam interactions. Stepped down from this position in August 2004.
11. Established superconducting RF activities at C-AD, built up the group, facilities and projects, including the 56 MHz cavity for RHIC, SRF electron guns at 1.3 GHz, 704 MHz and 112 MHz, highly damped elliptical 5 cell accelerating cavities at 704 MHz.
12. Past Group Leader of Superconducting Accelerator and Electron Cooling of the Relativistic Heavy Ion Collider. Development of an intensive R&D program on various aspects of high-energy electron-cooling and SRF science and technology, including a high-current energy-recovery linac and cooling software.
13. Past Assistant to the Laboratory Director for Novel Accelerators.
14. Past Acting Head, past Deputy Head, BNL Center for Accelerator Physics
15. Initiated and participated in Free-Electron Laser experiments at the NSLS, including the High-Gain Harmonic-Generation FEL, first SASE measurement in the visible using a micro-undulator and VISA experiment.
16. Proposed the "fresh bunch" technique for high-gain harmonic generation FEL.
17. Developed a superconducting micro-undulator (8.8 mm period).
18. Developed new superconducting accelerating structures: The high-current 5-cell fully damped ERL cavity, a high-current SRF photoinjector (in progress), a 56 MHz SRF storage cavity for RHIC (in progress) and a quarter-wave resonator crab cavity for the LHC and eRHIC (in progress).
19. Developed several generations of high brightness photoinjectors, pulsed copper and superconducting.
20. Developed advanced electron beam diagnostics, including the 'slice emittance' measurement and phase space tomography for the characterization of multi-dimensional phase space of picosecond electron bunches and single-shot spectral measurement for non-destructive pulse length of an electron bunch.

21. Proposed and participated in the STELLA experiment, the first staging of two laser accelerators.
22. Proposal and work on the use of an energy recovery linac for electron cooling of RHIC and for an electron - ion collider in RHIC (eRHIC).
23. Initiated research on high-charge polarized electron sources at BNL's Collider-Accelerator Department.
24. Former Chair, the BNL Council (1998-1999).
25. Served as member of Management Team (1990-2002), National Synchrotron Light Source.

1988-1989: Visiting Physicist, NSLS, Brookhaven National Laboratory, NY 11973 and Visiting Professor of Physics, Physics Department, SUNY at Stony Brook, NY 11794. Developed the first superconducting RFQ.

1970-1989 Weizmann Institute of Science, Rehovot 76100 Israel
Senior Research Fellow, Head, Cryogenic Laboratory.
Salient Topics:
[1.] Project leader for research of superconducting quarter wave resonators and investigation of electron multipactoring in quarter wave resonators.
[2.] Project leader for research and development of current leads for the super-conducting magnets of the Hadron Electron Ring Accelerator.
[3.] In charge of the development and construction of a heavy ion superconducting linac.
[4.] Lead development of a sub-nanosecond chopper system for the Pelletron electrostatic accelerator.
[5.] Beam dynamics theory and numerical calculations, including the super-conducting RFQ, a deflector-redeflector chopper, superconducting linac post-accelerator and electron beam transport in electrostatic accelerators.
[6.] Guided the development of a tandem accelerator electron acceleration with beam energy recovery for a free electron laser.

1980-1982: Physics Department, SUNY at Stony Brook, Stony Brook, NY 11794. Visiting Associate Professor. Member of the Stony Brook Superconducting Linac Construction Team. Particular Responsibilities:
[1.] Lead development of the superconducting quarter wave resonator (this resonator became the basis of the Weizmann Institute's linac and many other machines, e.g. at University of Washington, Seattle, ALPI, FRIB, ISOLDE, ISAC, etc).
[2.] Guided the development of a self-excited RF loop resonator controller for cryogenic linacs.
[3.] Was responsible for superconducting accelerator and resonator research and testing.

1970-1975: W.W Hansen Laboratories of Physics, Stanford University, Stanford, CA 94305
Visiting Research Associate, Member of the superconducting heavy ion linac R&D team.
Main Subjects:

[1.] Developed a niobium superconducting reentrant cavity and its surface processing system.
[2.] Worked on beam dynamics of heavy ion linacs.
[3.] Researched electron loading phenomena in resonant cavities.

[4.] Developed the first computer code for multipacting in RF cavities.

Consulting, editorial and Review Committee Service:

(1) 1987-1991, adviser to the ALPI project, Italian INFN Legnaro (Padova) Laboratories.
(2) 1984-1987, consultant to the University of Washington in Seattle on the superconducting linear accelerator project.
(3) 1991, member CEBAF FEL Advisory Panel.
(4) 1991, member of the Los Alamos Pion Linac Advisory Committee
(5) 1992 chair SLAC Linear Coherent Light Source advisory panel,
1997 member SLAC LCLS technical review committee.
(6) 1992, 1994 technical consultant, DOE review of SLAC's Linear Collider Test Accelerator.
(7) 1994, 1995, 1999, 2000, 2004 technical consultant, DOE review of UCLA's Advanced Accelerator Research Program.
(8) 1995, member, Search Committee for the NSLS Chairperson.
(9) 1995, co-editor, Nuclear Instruments and Methods in Physics Research A volume 375.
(10) International Advisory Committee on the APLI Positive Ion Injector, INFN Legnaro (Padova) Italy. 1996, Chair, 1997, member.
(11) 1996, 1997 technical consultant, DOE review of Argonne National Laboratory's High Energy Physics program.
(12) 1996-1997 member, the Wilson Prize Selection Committee of the APS.
(13) 1997, member, APS Division of Physics of Beam nominating committee
(14) 1997, member, Review Committee of the editor and journal Physical Review E.
(15) 1997, member, APS Division of Physics of Beam New Journal Committee.
(16) 1997, member, Scientific Advisory Committee, LBNL Center for Beam Physics
(17) 1998-2003, member, editorial board, Physical Review Special Topics, Accelerators and Beams.
(18) 1998, 1999 technical consultant, DOE review of Lawrence Berkeley National Laboratory's High Energy Physics program.
(19) 1999- 2003 Member, Linear Coherent Light Source R&D Management Group.
(20) 2001-2005, Member International Committee on Future Accelerators.
(21) 2001, 2002, 2004 Membership in various NSF review panels.
(22) 2001, Member SLAC Experiment Advisory Committee.
(23) 2002-2005, Member, 4GLS International Advisory Committee, Daresbury Laboratory, England.
(24) 2003, technical consultant, DOE review of SLAC's High Energy Physics program.

(25) 2005, member, Technical Board, ILC Test Facility collaboration.
(26) 2005-2006, member, AARD HEPAP Sub-panel, DOE OHEP and NSF.
(27) 2006-2009, member, Cockcroft Institute Science Advisory Committee.
(28) 2007, member, DOE review of BELLA at LBNL.
(29) 2006-2007, member, University of Maryland UMER Science Advisory Committee.
(30) 2006, 2007, member, DOE review of ILC Americas Regional Team.
(31) 2007, member DOE review of LHC Accelerator Research Program.
(32) 2007 – 2013, member, Fermilab Accelerator Advisory Committee
(33) 2007 - 2008, member, National Academies of Science / National Research Council FEL Study Committee.
(34) 2011-2012 Member, CERN (Geneva) LHC Crab Cavity Advisory Board
(35) 2013-2016 Member, High Energy Advisory Panel, US DOE.
(36) 2013-2016 Member Advisory Committee on TRIUMF (ACOT) for the NRC of Canada.
(37) 2014 Member, HEPAP Accelerator R&D Sub Panel
(38) 2014, 2015, 2016 – Chair, FLASHForward Scientific Advisory Board
(39) Member, DESY (Hamburg Germany) Machine Advisory Committee, 2018-2020
(40) Member, FACET II (SLAC, CA) Program Advisory Committee, 2018-2020

Contributions to Conferences and Workshops:

[1] 1984 RF Superconductivity Workshop, CERN Switzerland, Session chair.
[2] 1985 Symposium of Northeastern Accelerator Personnel, Argonne National Laboratory, USA. Session chair.
[3] 1988, 10th International Free Electron Laser Conference, Jerusalem, Israel, Chair of local organizing committee and session chair.
[4] 1989. 5th International Conference on Electrostatic Accelerators and Associated Boosters. Member of the Scientific Advisory Committee.
[5] 1991, 1992, and 1994 APS Washington April Meeting, session chair.
[6] 1992 and 1994, International Linac Conference, member of the program committee.
[7] 1992, 4th Generation Light Source Workshop (SSRL), Chair of the Linac Based radiation Sources Working Group.
[8] 1992, 3rd Workshop on Advanced Accelerator Concepts, Chair of the Local Organizing Committee.
[9] 1992- 2017, Workshop on Advanced Accelerator Concepts, member of the Organizing Committee.
[10] 1993, Co-chair, Towards Short Wavelength FELs Workshop, BNL.
[11] 1993, 1995, 1997, 1999, 2001, Particle Accelerator Conference, member of the program committee.
[12] 1993, Co-chair, SPIE Technical Conference 2013, Electron Beam Sources of High Brightness Radiation, San Diego CA.
[13] 1994-present, Member, International Executive Committee, Free-Electron Laser Conference.
[14] 1995, Co-chair, 17th International Free-Electron Laser Conference.
[15] 1996-1999, Chair of the Program Committee of the 1999 Particle Accelerator Conference.

[16] 1998, member, Program Committee, European Particle Accelerator Conference
[17] 1998, Session Chair, International Symposium on Environment-Conscious Innovative Materials processing with Advanced Energy Sources, Kyoto, Japan, November 23-27, 1998.
[18] 1999, Chair, Working Group on Linac-Based, High-Gain FELs at the ICFA 17th Advanced Beam Dynamics Workshop of Future Light Sources, Argonne National Laboratory.
[19] 1999, Member, International Advisory Committee, ICFA Symposium, New Visions in Laser-Beam Interactions - Fundamental Problems and Applications of Laser-Compton Scattering, Tokyo Metropolitan University.
[20] 1999-2003, 2005-2009, Member, Organizing Committee of the Particle Accelerator Conference.
[21] Co-Chair, 2001, 2003 ICFA Workshop on Laser – Beam Interactions
[22] Chair, Program Committee, 2001 International FEL Conference.
[23] Co-convener, Snowmass 2001 Lepton-Hadron Colliders Working Group
[24] Chair, Working Group on Energy Recovery Linacs at the ICFA 24th Advanced Beam Dynamics Workshop of Future Light Sources, Spring8, Japan
[25] 2002, 2005 Member, Organizing Committee, The Physics and Applications of High Brightness Electron Beams Workshop.
[26] 2003, 2005 Co-Chair, Working Group Navy FEL Workshop
[27] Chair, 2004 Advanced Accelerator Concepts Workshop
[28] Member, 2005, 2007, 2009, 2011, 2013, 2015, 2017 Member, International Organizing Committee, ERL Workshop
[29] Member, 2005, 2007, 2009, 2011, 2013, 2015, 2017 Member International Beam Cooling Workshop Organizing Committee
[30] Member, International Advisory Committee, Laser and Plasma Accelerator Workshop, 2005, 2007, 2009, 2011, 2013, 2015, 2017
[31] Member, International Organizing Committee, 2007 Asian Particle Accelerator Conference.
[32] Chair, Electron Cooling of RHIC Workshop, May 24-26, 2006.
[33] Co-Chair, LHC Crab Cavity mini-workshop, February 25-26, 2008.
[34] 2008-2010, Member, Organizing Committee, International Particle Accelerator Conference.

Partial list of grants:

1988-1990, NSF, Development of the Superconducting RFQ (Co-PI with Prof. Peter Paul).
1990-2004, DOE Office High Energy Physics and Office of Basic Energy Science, Development and Operations of the BNL Accelerator Test Facility, renewable grant. The annual grant value in 2004 was $1.9M from HEP and $0.5M from BES.
Various BNL Laboratory Directed R&D grants: Photoinjector ($0.7M), ATF ($0.8M), Superconducting Micro-undulator ($0.3M), High-Gain Harmonic Generation FEL ($0.4M), Visible FEL ($0.2M), High-Brightness Electron Beams ($0.65M), Superconducting ERL Cavity ($1.3M), Photocathodes ($0.53M), Polarized Electron SRF gun ($0. 5M), Funneling Polarized Electron Gun ($1.2M), ATF Proposal Development ($0.25M)
Various CRADA (Cooperative R&D Agreements): Photoinjector ($0.2M), Superconducting Undulator ($0.2M)
Various SBIR grants (participation with industry): SRF Photoinjector (with AES), code development of electron cooling (with Tech-X), magnetized electron beam dynamics (with Tech-

X), 112 MHz SRF gun (with Niowave), 28 MHz SRF tunable cavity (with Niowave) all achieved Phase II.
Various DOD grants: ERL cavity ($0.75M), Diamond Amplified Photocathode ($1M), ERL ($1M), SRF Photoinjector ($6.2M).
Diamond amplifiers (DOE HEP) ($0.7M)
SRF Cavity for High Current Proton Linac (DOE HEP) (2009-2013, $1.3M)
Photocathodes for High Repetition rate Light Sources, (DOE BES), (2011-2014, $1M)
ATF-II Upgrade (DOE HEP) ($5M).