**CV Curriculum Vitae Nov. 2019**

Murray A. MOINESTER, Emeritus Professor of Physics

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CV - Curriculum Vitae - Nov. 2019: **CVmoinester\_long2.docx, CVmoinester\_short2.docx**

Born: February 14, 1940, New York City, USA; Citizenship: USA, Israel

Married: Susan; Children: Ruth, Nina, Yael; Grandchildren: Maya, Toby, Tomer, Ori

Current Hobbies: Hiking, Travel, Spanish, Reading, Music

**Photos: COMPASSsetp.pdf, SELEXsetup.pdf, PiPolMainz.pdf, MULTISPECTRAL\_IMAGING.pdf**

EDUCATION

B.Sc. 1961 City College of CUNY, New York, USA

M.S. 1963 University of Rochester, Rochester, New York, USA

Ph.D. 1968 University of Rochester, Rochester, New York, USA

Ph.D. Thesis: The (3He,d) Reaction on 35Cl and 37Cl and the Structure of 36Ar and 38Ar

Advisor: Prof. W. Parker Alford.

Languages; English, Hebrew, German, French, Spanish

Short Bio: Murray Moinester received his Ph.D. from the University of Rochester in 1968, and then joined the faculty at Tel Aviv University. He served as guest professor for extended periods at many leading universities and accelerator laboratories, has extensive experience in experimental and computational methods, carried out many research programs in high energy particle and nuclear physics, published some 200 scientific papers in refereed journals, and made some 75 conference or university presentations. Since his official retirement in 2003, he continues researching in the fields of Hadron Physics (pion polarizability, etc.), Archaeology (Multispectral imaging & RHX dating), environmental radioactivity, & soil science (carbon sequestration).

**ACADEMIC AND PROFESSIONAL AWARDS**

1961: Phi Beta Kappa, Sigma Phi, City College of CUNY.

1975-1977: Israel Commission for Basic Research (Grant Number 6439) - Research grant, Study of Pion-Nucleus Reactions

1976-1983: United States-Israel Binational Science Foundation - Research grants, Study of Pion-Nucleus Charge Exchange Reactions

1981-1984: United States-Israel Binational Science Foundation - Research grant, Transverse Electron Scattering from Light Nuclei, Grant No. 2636/81

1987: National Sciences and Engineering Research Council of Canada, International Scientific Exchange Award.

1989-1992: Research Grant, Photonuclear Reactions at LEGS (Laser-Electron Gamma Source), U. S. – Israel Binational Science Foundation Grant 88-00492.

1993-1999: Pion and Sigma Polarizabilities and Radiative Transitions at FERMILAB, U. S. - Israel Binational Science Foundation Grants 92-00289, 95-00431.

1996-1999: Chiral Anomaly Tests, Israel Academy of Science Grant.

1999-2002: Hadron-Lepton Interactions at SELEX and COMPASS, Israel Academy of Science

2003: Gerardus Mercator Professor, Johannes Gutenberg University, Mainz

2012: Israel Ministry of Environmental Protection Grant, Radioactive nuclides contamination in agricultural soil and sludge in Israel

**MEMBERSHIP IN PROFESSIONAL SOCIETIES**

American Physical Society (USA), Israel Physical Society, European Physical Society, Phi Beta Kappa, Sigma Phi, Geological Society (USA), Society for American Archaeology

**GRADUATE STUDENTS SUPERVISED**

2005: Igor Giller, Ph.D.

 Pion Polarizability Measurement via Radiative Pion Photoproduction

 (Advisor: M. A. Moinester)

2000: Aharon Ocherashvili, Ph.D.

 Pion Virtual Compton Scattering

 (Advisor: M. A. Moinester)

1999: Igor Giller, M.Sc.

 Pion Charge Radius

 (Advisor: M. A. Moinester)

1994: Hartmut Hahn, Ph.D.

 Pion Absorption on the Diproton at Low Energies

 (Advisor: M. A. Moinester)

1984: Adoram Erell, Ph. D.

 Study of Isovector Giant Resonances by Pion Charge Exchange Reactions

 (Advisor: J. Alster; Assistant: M. A. Moinester)

1981: Alex Doron, Ph.D.

 Pion‑Nucleus Charge Exchange Reactions on Light Nuclei

 (Advisor:  J. Alster; Assistant: M. A. Moinester)

1979: Shalev Gilad, Ph.D.

 Design, construction, and performance of a high-resolution *π*0 spectrometer

 (Advisor:  J. Alster; Assistant: M. A. Moinester)

**ACADEMIC AND PROFESSIONAL EXPERIENCE**

2003-present – Emeritus Professor, Tel Aviv University, TAU

1988-2003 – Professor, TAU; 1980-1988 – Associate Professor, TAU

1973-1980 – Senior Lecturer, TAU; 1970-1973 – Lecturer, TAU; 1968-1970 – Instructor, TAU

2009-2012, Institute of Archaelogy, TAU, Consultant, Infrared Imaging & Scientific Dating

2008 - Sysconet Information Technologies Ltd., Herzliya, Consultant, Border Control Technologies (Radioactivity)

2006-2007 Eitan-Mehulal Law Group, Herzliya, patent writer, 4 months

2004-2007 Bermuda Institute of Ocean Sciences, Adjunct Senior Scientist, Visiting Professor, 2 years

2002-2003 Mercator Professor, Visiting Professor, Johannes Gutenberg University Mainz, 1 year

2003 Visiting Professor, Institudo de Fisica, Universidad Autonoma San Luis Potosi, Mexico, 2 months

1994-1999 Visiting Professor, Max Planck Institute, Heidelberg, Germany, 6 months

1999-2011 Visiting Professor, CERN, Geneva, 6 months

1991-1998 Visiting Professor, Fermi National Accelerator Laboratory, 6 months

1992-1993 Visiting Professor, Laboratori Nazionali de Frascati dell’ I.N.F.N., Frascati, Italy, 2 months

1988-1990 Visiting Professor, Brookhaven National Laboratory, N.Y., 2 months

1981-1993 Visiting Professor, TRIUMF Meson Facility, University of British Columbia, 3 years

1980-1984 Visiting Professor, M.I.T. BATES Electron Accelerator, 2 months

1980-1981 Visiting Professor, University of Massachusetts, Amherst, Mass., 1 month

1976-1977 Research Consultant, Oak Ridge National Laboratory, 8 months

1974-1986 Visiting Staff Member and Visiting Scientist, Los Alamos National Laboratory, Meson Physics Facility, 3 years

1970-1975 Research Associate and Visiting Scientist, Centre d’Etudes Nucléaires de Saclay, France, 2 years

1969-1970 & 1994 Visiting Scientist, Université Joseph Fourier, Laboratoire de Physique Subatomique et de Cosmologie, Grenoble, France, 4 months

1961-1968 Teaching and Research Assistant ,University of Rochester, Rochester, N.Y.

**RESEARCH FIELDS**

RHX (Rehydroxylation) Dating, Multispectral Imaging, Radon Diffusion & Detection, Environmental Radioactivity, Patent law, Pion Polarizability, Chiral Anomaly, Doubly Charmed Baryons, Giant Resonances, Charmed Baryons and Mesons, Hybrid Mesons, gluon polarization in nucleons, flavor decomposition of the nucleon spin, search for exotic states, light meson spectroscopy, nuclear dependence of charm production, kaon Bose–Einstein correlations, Form Factors, Pion Scattering and Absorption Reactions, Nuclear Stripping and Pickup Reactions, Electron Scattering, Pion and Nucleon Induced Charge Exchange Reactions, Photo-Nuclear Reactions, Soil Science (Carbon Sequestration), Statistics for Social Sciences

**RESEARCH - GENERAL DESCRIPTION**

I carried out research programs in high energy particle and nuclear physics during 1969-2012 at leading accelerator laboratories and universities worldwide (CERN in Switzerland, Heidelberg and Mainz in Germany, Grenoble and Saclay in France, Frascati in Italy, TRIUMF in Vancouver, B.C., Canada; FNAL, MIT, BNL, ORNL, LANL, UMass in USA, etc.). From 1968- 1988, these programs included one or more of my TAU colleagues Aviv Yavin, Daniel Ashery, Jonas Alster, Jechiel Lichtenstadt, Eli Piasetzky; and TAU graduate students. These research programs, following approval by the laboratory program advisory committees, focused on hadron structure and spectroscopy. They were based on a wide range of experimental apparatus, each program having its own special setup. Parts of the hardware and software for these experiments were designed, constructed, and tested at TAU. Data collection was carried out at the accelerator laboratories. Data analysis and writing journal articles was carried out at TAU and the host laboratories. Funding for our TAU participation was achieved by earning competitive grants, generally via the US-Israel Binational Science Foundation and the Israel Science Foundation. Research results are described in journal publications and conference presentations. My soil science studies involve the sequestration of atmospheric carbon dioxide in connection with climate studies. My archaeology studies involve multispectral imaging of ostraca and ceramics rehydroxylation studies for scientific dating. My environmental radioactivity studies deal with the health impact of radioactivity in phosphate fertilizers and its phosphogypsum byproducts, and radon diffusion measurements.

I gained high level expertise during my teaching and research career with integrated command and control systems of detector apparatus. These allowed for on-line monitoring and control of the performance of a large variety of detection apparatus, and coordinated acquisition, handling, display and analysis of the data. My expertise was achieved through the many courses that I taught (graduate applied and theoretical Nuclear Physics, Electromagnetism, Classical and Quantum Mechanics, Electronics, Hearing and Speech Sciences, etc.), and through the many particle and nuclear physics experiments in which I participated at accelerator laboratories.

My major scientific achievements include: (a) leading systematic studies of pion polarizability using different methodologies, culminating with the successful effort to achieve a quality pion polarizability measurement at CERN COMPASS to provide an important test of chiral perturbation theory, and writing a 2019 review article on this subject; (b) spearheading the search and discovery of doubly charmed baryons via a groundbreaking 1996 review article hunter’s guide, leading to subsequent successful studies at FNAL and CERN; (c) actively contributing to the discovery of the isovector monopole giant resonance at LAMPF via the design and use of a high resolution neutral pion spectrometer for studies of pion charge exchange reactions; (d) identifying “missing’ Gamow-Teller strength in the (n,p) charge exchange continuum, by developing and applying a multipole decomposition analysis that has been since widely adopted; (e) measuring (n,p) measuring charge exchange reactions at TRIUMF, discovering spin isovector giant resonances in the continuum spectra via a multipole decomposition analysis; (f) theory analysis that revealed the multipole composition of the shell-model effective residual interaction, results quoted in detail in DeShalit-Feshbach’s nuclear structure textbook; (g) studies of nucleon-nucleon correlations via pion absorption and photodisintegration on a proton pair (in He3) and the inverse pion production process; (h) leading a TAU team to design, construct and use a low cost multispectral imaging laboratory for imaging archaeological ostraca, and then observing a biblical period inscription unnoticed for half a century; (i) climate engineering based on soil composition measurements at Yatir Forest in Israel, demonstrating how to mitigate global warming by sequestering atmospheric carbon worldwide as inorganic carbon (calcite) in the unsaturated zone under semi-arid forests; (j) Rehydroxylation (RHX) studies in ceramics for developing this technique for the purpose of scientific dating of archaeological ostraca.

**Publications** All publications, including my Google Scholar Citation Profile, are given in Google Scholar link: https://scholar.google.co.il/citations?user=mCPLVIYAAAAJ&hl=enor **Murray Moinester - Google Scholar Citations - Nov 12, 2019.pdf**

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| --- | --- | --- |
| **Citation Profile** | All | Since 2014 |
| Citations | 10222 | 2902 |
| h-index | 52 | 26 |
| i10-index | 124 | 40 |

where h-index=52 denotes 52 articles with 52 or more citations,

and i10-index=124 denotes 124 articles with 10 or more citations.

**RECENT CONFERENCE AND SEMINAR PRESENTATIONS**

**Carbon Sequestration:**

**Gothenburg, Sweden:** 2nd International Conference on Negative CO2 Emissions, May 12-15, 2020

**Barcelona, Spain:** Goldschmidt Conference, Aug. 18-23, 2019, oral presentation https://goldschmidt.info/2019/abstracts/abstractView?id=2019001259

**Jena, Germany:** Visiting Dr. Christian Roedenbeck, Max Planck Institute for Biogeochemistry, Seminar, Aug. 29, 2019

**Pomplona, Spain:** Visiting Prof. Juan Blanco, Universidad Pública de Navarra, Dep. Ciencias del Medio Natural, **Seminar (PomplonaSeminar.pdf) & Radio Interview in Spanish (Radio Pamplona 11\_09\_2019 .mp3),** Sept. 11, 2019

**Valladolid, Spain:** visiting Prof. Felipe Bravo, Universidad de Valladolid (Palencia Campus), Sustainable Forest Management Research Institute, Seminar, Sept. 17, 2018,

**Wageningen, The Netherlands:** Soil Conference, Aug. 27-31, 2017, oral presentation

**Salt Lake City, Utah:** American Meteorological Society’s 32nd Conference on Agricultural and Forest Meteorology, 20-24 June, 2016, Session 2: 'Drought Effects on Semi-Arid Ecosystems". **Recorded Presentation****:** https://ams.confex.com/ams/32AgF22BLT3BG/videogateway.cgi/id/34381?recordingid=34381&uniqueid=Paper292197&entry\_password=343788

**Valencia, Spain:** World Conference on Climate Change, Oct. 24-26, 2016, oral presentation

**Berlin, Germany:** M. Moinester, J. Kronfeld, I. Carmi, “Sequestration of Inorganic Carbon via Forestation”, Poster presented at the Climate Engineering Conference, 18-21 August 2014, **BerlinSequestration.pdf**

**Pion Polarizability:**

**St. Petersburg, Russia:** Nuclear Physics Institute, Visiting Prof. George Alkhazov, Seminar scheduled May 21, 2020

**Helsinki, Finland:** Institue of Physics, Visiting Prof. Keijo Kajantie. Seminar scheduled May 26, 2020

**Mainz, Germany:** Visiting Prof. Stefan Scherer, Institut für Kernphysik, Seminar, April 29, 2019 (**MainzPiPol.pdf)**

**Valparaiso, Chile:** Hep2018 Conference, Jan. 8-12, 2018, oral presentation

**Brasov, Romania:** Nuclear Photonics 2018 Conference, June 24-29, 2018, **poster** presented (**BrasovPiPol.pdf**)

**Madrid, Spain:** Visiting Prof. José Ramón Peláez Sagredo, Departamento de Física Teórica, Universidad Complutense de Madrid, Pion Polarizability Seminar, Wed. Sept. 12, 2018

**Tsukoba, Japan:** QNP2018, 8th International Conference on Quarks and Nuclear Physics, Nov. 13-17, 2018, oral & written contributions (**JPS\_PiPol.pdf**)

**Batavia, Illinois:** APS Division of Particles and Fields Meeting, July 31-Aug. 4, 2017, Fermilab, oral presentation & written contribution, https://arxiv.org/vc/arxiv/papers/1709/1709.05159v2.pdf

**Seattle, WA:** Visiting Prof. Gerald Miller, Univ. of Washington, Dept of Physics, "Pion Polarizability" Seminar, Aug. 9, 2017

**Montreal, Quebec, Canada:** Visiting Dr. George Azuelos, Univ. of Montreal, "Pion Polarizability" Seminar, May 30, 2016

**Tel Aviv:** Pion Polarizability, Joint Seminar in Nuclear Physics, 23 Nov. 2015

**Stockholm, Sweden:** Europhysics Conference on High Energy Physics, 18‐24 July 2013, http://pos.sissa.it/archive/conferences/180/085/EPS-HEP%202013\_085.pdf

http://wwwcompass.cern.ch/compass/publications/talks/t2013/moinester\_eps2013.pdf

**Newport News, VA:** APS Division of Nuclear Physics, Meeting, 23-26 Oct. 2013. http://wwwcompass.cern.ch/compass/publications/talks/t2013/moinester\_aps2013.pdf

**Seattle, WA:** Institute for Nuclear Theory program INT-12-2b, University of

Washington, "Lattice QCD Studies of Excited Resonances and Multi-Hadron Systems"

 July 30 – Aug. 31, 2012, oral presentation

Prague, Czech Republic, 14 - 27 Jul 2002, Czechoslov. J. Phys. 53 suppl. (2003) b169-87, https://cds.cern.ch/record/600393/files/0301024.pdf

**Other:**  U. Illinois, Virginia Tech, U. Wyoming, Technical University of Munich,

U. Bristol, Max Planck Institute for Nuclear Physics – Heidelberg; Advanced Study Institute on Symmetries and Spin, Prague, Universidad Técnica Federico Santa María, Valparaiso, Chile; Newport News,Virginia - 2013 APS Division of Nuclear Physics;

**RHX Dating:**

**Leipzig, Germany:** Sächsische Akademie der Wissenschaften RHX Symposium, March 23, 2016, oral presentation

**Miami, FL:** Visiting Prof. Misak Sargsian, Florida International University, April 3, 2015 colloquium

**Seattle, WA:** Visiting Prof. Jim Feathers, Luminescence Dating Laboratory, Anthropology Department, U. Washington, April 24, 2015 Seminar, RHX Dating of Archaeological Ceramics

**Tel Aviv:** School of Physics and Astronomy Colloquium, June 21, 2015

## **Dresden, Germany:** Diffusion Fundamentals VI Conference, Aug. 23 - 26, 2015, **DresdenRHX.pdf** **poster**

**Vancouver, B.C.:** Visiting Dr. Makoto Fujiwara, TRIUMF particle accelerator center, colloquium Aug. 9, 2012

**Rehovot:** Israel Society for Clay Research, Hebrew U. Faculty of Agriculture, Food & Environment, Oct. 5, 2010, oral presentation.

**Doubly Charmed Baryons:**

**Tel Aviv:** First Observation of a Family of Double-Charm Baryons, colloquium, 2007

**Mainz, Germany:** Visiting Prof. Thomas Walcher, Institut für Kernphysik, Seminar, 2004

**Prague, Czech Republic:** Advanced Study Institute, "Symmetries and Spin" - Praha-SPIN-2002, Invited Talk, First Observation of Doubly Charmed Baryons, M.Moinester et al. (SELEX), Czech. J. Phys. 53B, 201-213, 2003; https://arxiv.org/pdf/hep-ex/0212029.pdf

**Vancouver, B.C.:** TRIUMF particle accelerator center, colloquium, July 10, 2003

**Mexico City:** Physical Society of Mexico, invited talk, 2003

**Rehovot, Israel:** Weizmann Institute, October 20, 2003, New Horizons for Charm Baryon Spectroscopy, http://www.weizmann.ac.il/conferences/hera/pdf/wihq.pdf

**Riga, Latvia:** U. Latvia Institute of Atomic Physics and Spectroscopy

**Charged Pion Lifetime, Electron Scattering on Sm Isotopes**

**Los Alamos, NM:** 1976, 1977, LANL-LAMPF, Seminars

## **Giant Resonances: Athens, Georgia:** U. Georgia; **Bloomington, Indiana:** Indiana U.**; Vancouver, Canada:** TRIUMF UBC

**Color fluctuations and transparency**

**Tel Aviv:** TAU, 1996, seminar; **London, UK**: University College London, 2000, seminar; **Prague, Czech Republic:** Charles U.,2002, seminar

**Primakoff Physics (Hybrid Mesons, Chiral Anomaly, Radiative Transitions)**

**Geneva, Switzerland:** Workshop on Future Physics at COMPASS, oral presentation & written contribution, M. Moinester, Hybrid Meson Production via Pion Scattering from the Nuclear Coulomb Field, CERN, 26 - 27 Sep 2002, pp.77 (CERN-2004-011), http://cds.cern.ch/record/600392/files/p77.pdf

**Miami, FL:** Visiting Prof. Misak Sargsian, Florida International University Seminar, Hybrid Mesons, Feb. 21, 2011; **Tel Aviv:** Seminar, Hybrid Mesons, 2011

**Other:** International Workshop on Hadron Structure and Hadron Spectroscopy, Trieste, Italy, Feb. 2002, https://hadron2002.ts.infn.it/fileadmin/slides/Moinester-M.pdf; Universidad Autónoma de San Luis Potosí; Warsaw, Poland -Soltan Institute for Nuclear Studies; Laboratori Nazionali de Frascati dell’ I.N.F.N.; Università degli Studi di Milano; Bormio, Italy - https://arxiv.org/pdf/hep-ex/9903017.pdf