

NAME	CURRENT POSITION	BIRTHDATE
Lawrence H. Heilbronn	Assistant Professor, University of Tennessee Nuclear Engineering Department	21 Dec., 1956

CITIZENSHIP: U.S.

Experience in experimental nuclear physics:

- 30+ experiments conducted at 12 accelerator facilities in the U.S., Canada and Japan.
- Principal investigator on several high-energy neutron experiments focused primarily on neutron production from heavy-ion interactions.
- Expertise in design, construction, and implementation of neutron detectors used in high-energy accelerator-based experiments. Developed analysis techniques tailored for data derived from liquid scintillators.
- Principal Investigator on NASA-funded research grants supporting experimental and transport modeling work.
- Committee member of Ph.D. and Masters candidates, and mentor of undergraduate students participating in summer internships.
- Expertise in the implementation and running of the online dosimetry system used for radiobiology experiments conducted at the AGS facility at Brookhaven National Laboratory.
- Experience in imaging techniques used in hadron radiotherapy for patients with arteriovenous malformations.
- Extensive knowledge of the experimental data base of neutron production measurements from heavy-ion interactions to be used for the development of transport model calculations.
- Experience in fortran programming.

EDUCATION

<u>Institution</u>	<u>Degree</u>	<u>Year</u>	<u>Field of Study</u>
Michigan State Univ.	Ph.D.	1991	Nuclear Physics
U. of Illinois, Urbana	M.S.	1984	Physics
U. of Montana, Missoula	B.A.	1982	Physics

PROFESSIONAL EXPERIENCE

Feb.1993-July 2008	Staff Scientist, Life Sciences Division, Lawrence Berkeley Lab., Berkeley, CA
May.1991-Feb.1993	Post-doctoral Fellow, Research Medicine and Radiation Biophysics, Lawrence Berkeley Lab., Berkeley, CA
Jan.1985-Apr.1991	Research Assistant, National Superconducting Cyclotron Lab, Michigan State Univ., East Lansing, MI
June 1983-Aug.1984	Research Assistant, University of Illinois

PROFESSIONAL MEMBERSHIP

American Physical Society

PROFESSIONAL AWARDS

1996 – Outstanding Performance Award, Lawrence Berkeley National Laboratory
2002 – Outstanding Performance Award, Lawrence Berkeley National Laboratory

PROFESSIONAL BACKGROUND

1984-1990 - Graduate Research Assistant, National Superconducting Cyclotron Laboratory, Michigan State University, Dr. Aaron Galonsky, advisor. Did research on intermediate-mass fragment production in heavy ion reactions (35 - 50 MeV/nucleon). Did extensive work on vacuum systems, mounting hardware design for silicon

detectors, and refrigeration systems to be used under vacuum. Did analysis of the data to investigate the contribution of projectile fragmentation, deep-inelastic reactions, and quasi-elastic reactions in the production of IMFs in heavy-ion reactions. Ran several neutron-fragment coincidence experiments. Experimental responsibilities included: design and construction of liquid-scintillator neutron detectors, testing and calibration of silicon detectors, target design and construction, electronic logic design and development, vacuum and refrigeration system development, flight-path logistics for TOF part of experiments, neutron shadow-bar design and mounting, and use of radioactive sources such as PuBe and Co-60 for neutron detectors and Na-22, Th-C" for silicon detectors. Analysis responsibilities included: the calculation of neutron detection efficiency and neutron flux attenuation (including code development), calculation of inclusive IMF production cross sections, neutron-unbound state production cross sections, the deduction of nuclear temperatures from relative populations of neutron-unbound states and ground-states of IMFs, the development and use of a code to calculate the effect of feeding from both discrete and continuum states of nuclear matter, and the development of a technique used to measure the energies and widths of neutron-unbound states that is unique to heavy-ion reactions. Other projects during this time included the development of a novel pulse-shape discrimination technique to distinguish gamma-ray events from neutron-events in liquid scintillators, and participation in several experiments investigating nuclear structure effects in Li-6 and Li-7.

1991-2008 - Scientist, Life Sciences Division, Lawrence Berkeley Laboratory. Main area of research was fragment production from heavy-ion interactions that are relevant to radiation shielding and protection for humans engaged in work in low-Earth orbit and outside the geomagnetosphere. The primary focus of that research was the measurement of neutron production cross sections from heavy-ion interactions. Over the past 13 years, this has included over 15 time-of-flight experiments at various research facilities, and three experiments utilizing Bonner Spheres. The research has also included several charged-particle fragment production experiments at Lawrence Berkeley Laboratory, Brookhaven National Laboratory, the National Institute for Radiological Sciences in Chiba, Japan, and Loma Linda University Medical Center. The neutron-production measurements have been conducted at the NSCL, in Michigan State University, LBNL, and NIRS. Research responsibilities have included: development of data acquisition software, electronic-logic design, hardware development and staging, and spokesman duties for neutron TOF experiments at MSU. Analysis responsibilities have included: measurement of charge-changing and fragment production cross sections from 600 MeV/nucleon Fe reactions, and the measurement of stopping-target and thin-target neutron production yields. Have developed an offline analysis technique for the correction of excessive constant fraction discriminator walk. Other responsibilities have included the implementation and maintenance of a beam-line dosimetry system used for radiobiological experiments at the AGS in Brookhaven National Laboratory, along with some research into the response of various elements of the dosimetry system to high-energy Fe beams. Other projects at LBL have included the participation in the DLS (Di-Lepton Spectrometer) collaboration, participation in a radiotherapy program for the treatment of arterio-venous malformations, and dosimetry support for radiobiological experiments at the 88-inch cyclotron. Much of the research culminated in a handbook on secondary neutron production measurements and spallation products measurements from high-energy heavy-ion interactions, co-authored with Professor Takashi Nakamura of Tohoku University, Sendai, Japan.

COMMUNITY INVOLVEMENT

Speaker at local secondary schools on topics such as space science and experiences in my travels to Japan.
 Judge at several local and district-wide school science fairs.
 Adult leader and merit badge councilor for the Boy Scouts of America.

RECENT PRESENTATIONS

“Status of experimental data base development relevant to space radiation transport and protection”, International Conference on Environmental Systems (2004 ICES), Colorado Springs, July 2004

“Handbook on secondary particle production and transport by heavy ions of energies above 100MeV/nucleon – general view and contents”, Shielding Aspects of Accelerators, Targets and Irradiation Facilities (SATIF-7), Lisbon, Portugal, May 2004

“Overview of secondary neutron production relevant to shielding in space”, International Conference on Radiation Shielding (ICRS-10/RPS2004), Funchal, Madeira Island, May, 2004.

