

Dr. Michael J. Leitch  
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### **Personal**

Born January 15, 1952, Seattle, Washington.  
Married with two daughters.

### **Education**

1974-79        Massachusetts Institute of Technology, Cambridge  
                  Ph.D. Physics, January 1979.  
1970-74        University of Washington, Seattle  
                  B.S. Physics and Math, 1974.

### **Employment**

2012-present    Retired LANL Fellow  
1994-2012      Staff Member in P-25 Subatomic Physics Group at LANL.  
1985-1994      Staff Member, Nuclear and Particle Physics Research Group, P-2, in the  
                  Physics Division, LANL.  
1983-1985      Staff Member, Nuclear Chemistry Group, INC-11, at LAMPF, LANL.  
1982-1983      Research Associate, University of Victoria Group, TRIUMF, Vancouver,  
                  BC, Canada.  
1979-1982      Postdoc, Medium Energy Physics Research Group, MP-4, at LAMPF,  
                  LANL.

### **Memberships, Recent Committee service, etc.**

LANL Fellow (since 2012)  
PHENIX Deputy Director for Upgrades (2009-present)  
PHENIX Speakers Bureau (2009-present)  
PHENIX Heavy Quark Physics Working Group Convener (2008-2010)  
Member of PHENIX Executive Council (2001-2004, 2007 to present).  
PHENIX Muon Tracking Detector Council (2002–2003, 2006-present)  
PHENIX Run Coordinator for 2007 and 2008 runs  
Spokesman for Fermilab E866/NuSea (since February 1998).  
APS Fellow (since 2001).  
Co-convenor of RHIC-II Forward & Proton-Nuclear Science Working Group (2005-2006).  
APS Hadron Physics Topical Group (GHP) Executive Council (2005-2006).  
PHENIX Physics Impact Panel (2005).  
International Advisory Committee for Quark Matter 2002.  
Physics Department Visiting Committee, Abilene Christian University (1999-2002).  
LANL Library Board (2000 - 2001).  
High Energy Nuclear Physics Team Leader, P-25, LANL (1998-2003).  
Acting Deputy Group Leader, P-25 (December 1998 – February 1999).  
PHENIX Muon Task Force (1998).  
PHENIX Institutional Board representative for Los Alamos (1994 - 1997).  
HEPNET Technical Coordinating Committee (1987-1995).

Subatomic Physics Group Leader Evaluation Committee (1994).  
LANL Physics Division Subatomic Action Team (1994).  
LANL Physics Division Computer Security Working Group (1994).  
LANL Information Architecture Extended Team (1993-1994).  
LANL Computer Security CQI Team (1994).  
LANL Physics Division Review Committee for NWT Industrial Partnerships Pilot Program (1992).  
LAMPF Technical Advisory Panel (1989).  
Organizer and co-editor for the LAMPF Double Charge Exchange Workshops (1985 and 1989).  
American Physical Society member (since 1975).

### **Research Experience**

PHENIX at RHIC - Member of the PHENIX collaboration at RHIC; emphasis on muon final states, including Drell-Yan,  $\Phi$ ,  $J/\Psi$ , and  $\Upsilon$  production. Physics includes search for and study of the quark-gluon plasma, study of gluon saturation or shadowing, initial- and final-state effects, and modification of parton structure functions in nuclei. Deputy Operations Director for PHENIX, elected member of the PHENIX Executive Council and appointed member of the 4-person permanent PHENIX Speakers Bureau. Served on the Muon Task Force to rescope muon subsystem given budget overruns and delays. Also designed and built calibration system for the muon tracking detectors and organized a "Hard processes and RHIC physics" workshop at Los Alamos in summer 2000. Recognized leader in cold nuclear matter physics at RHIC, and mentor to many students and postdocs in PHENIX. Leader of the analysis to physics and lead writer of the Phys. Rev. Lett presenting the first  $J/\Psi$  results from d-Au collisions at RHIC. Leader for LANL for the operations for the Muon Tracking subsystem in PHENIX. Gave the lead Plenary PHENIX talk at the 2009 Quark Matter Conference, the most important conference in this field. Served as Run Coordinator for PHENIX for the 2007 and 2008 RHIC runs.

E866/NuSea at Fermilab - Spokesman since February 1998 and leader of the analysis efforts. This experiment measured the  $u$ -bar/ $d$ -bar asymmetry in the nucleon by measuring 800 GeV proton production of Drell-Yan di-muons from hydrogen and deuterium targets. It also made a number of other measurements including the nuclear dependence of  $J/\Psi$  production over a very broad range in the kinematic variables, the nuclear dependence of dimuon production at very low masses down to the  $\Phi$ , and angular distributions of  $J/\Psi$  production at very large  $x_F$ . Also developed software to sample and analyze a portion of the data in real time on 'back-end' UNIX computer systems connected to the VME-based DAQ system by ethernet.

E789 at Fermilab - This experiment yielded several important physics results including the nuclear dependence and cross sections for production of neutral D mesons, the cross section for production of B mesons, and the nuclear dependence near  $x_F = 0$  of  $J/\Psi$  production; all by 800 GeV protons on fixed targets. Besides being the analysis leader for the experiment, I personally analyzed and published a Physical Review Letter on the D meson results for the collaboration. I can also take credit for moving the analysis

software from VMS-based to fast UNIX-based computers and also onto the Fermilab parallel-processor farms which were used for the bulk of the production analysis.

E772 at Fermilab - In our first experiment at Fermilab we made very important and widely quoted measurements of the nuclear dependence of 800 GeV proton production of Drell-Yan,  $J/\Psi$ ,  $\Psi'$ , and  $\Upsilon$  di-muon pairs. These measurements are important for their determination of the modification of the sea anti-quark structure function in nuclei, and for the exploration of nuclear effects such as shadowing, intrinsic charm, initial-state energy loss effects, and final-state effects including absorption by co-movers and hadronization times. I was involved in all parts of the experiment but with particular emphasis on leading the analysis efforts and converting the analysis programs to run on the ACP-I VME-based parallel processing systems on which all of our production analysis and Monte Carlo was done.

Pion production of  $\eta$ 's - I was one of the leaders of the Eta collaboration headed by Jen-Chieh Peng which made various measurements of pion induced  $\eta$  production at LAMPF using several instruments including the LAS spectrometer, the PI-zero spectrometer, and the Eta spectrometer. The Eta spectrometer is a small photon-pair spectrometer that used Na(I) calorimeters and BGO converters and was built by us for these measurements. Recently this spectrometer has been moved to Brookhaven where we, along with Ben Nefkins' group, have begun similar measurements using higher energy pion beams.

#### LAMPF (1983-1991)

As a staff member, first in the INC-11 nuclear chemistry group, and later with P-2 in the physics division, I have been a leader in a number of pion-nucleus experimental programs, particularly in the area of low-energy pion charge exchange.

1) I was spokesman for a small but exciting experimental program which made some of the first measurements of low-energy pion double-charge exchange (DCX). At low energies the small single-charge exchange (SCX) cross section, high nuclear transparency to pions, and the necessity of DCX involving two nucleons, make this an ideal place to investigate nucleon-nucleon correlations. I was fully involved in all aspects of this

program, from proposals to final published results. We were also one of the first users of the LAMPF Clamshell spectrometer and made substantial contributions to its commissioning and initial operation. Major results of this program include the first complete DCX angular distribution and the energy dependence over the low-energy region for the double-isobaric analog transition on  $^{14}\text{C}$ , the systematics of analog and non-analog transitions for  $f^{7/2}$ -shell nuclei, and the detailed isotopic comparison of DCX from the Calcium isotopes in the low-energy region which showed very interesting results explained by two-nucleon correlations of the shell-model.

2) I was spokesman for a program to map out the systematics of low-energy SCX versus angle, energy, and nuclear mass. At low energies this reaction is sensitive to nuclear medium effects because of the increased penetration of the pion into the nuclear interior

and because of a strong cancellation of the elementary pi-nucleon s- and p-wave amplitudes which persists even in nuclei. In the early days of the Pi-zero spectrometer I was part of many of the large number of experiments done with it and was responsible for the first permanent electronics setup which has been used since.

TRIUMF (1982-1983):

As a research associate with the U. of Victoria group at TRIUMF, I have worked on an experiment which searched for muon to electron conversion in the field of a nucleus, using a time projection chamber (TPC). We also used the TPC to make the first partial angular distribution of pion double charge exchange at low energies. Also while at TRIUMF, I continued two of the experimental programs which I began while at LAMPF: measurement of the tensor polarization of the recoil deuteron in the reaction  $d(e,e')d$  (at the MIT/Bates electron LINAC), and low-energy pion single-charge exchange measurements at LAMPF.

LAMPF (1979-1982):

As a postdoc with MP-4 at LAMPF, I participated in numerous pion-nucleus experiments. Besides some of the pion single-charge exchange studies described above these included:

Tensor polarization studies of  $d(\pi,\pi')d$  at LAMPF,  $d(e,e')d$  at the MIT/Bates electron LINAC, building a tensor polarimeter for these measurements, and calibration of the polarimeter at the Berkeley 88-inch cyclotron.

A number of experiments to measure low-energy pion elastic scattering and the  $d(\pi,2p)$  reaction. This included an extensive program of elastic scattering measurements with the Bicentennial Spectrometer on which I played a major role in configuring for these measurements.

Massachusetts Institute of Technology (1974-1979):

As an MIT graduate student I was involved in a program of photo-nuclear reaction studies including  $^{16}\text{O}, ^{40}\text{Ca}(\gamma,p)$  cross section measurements (thesis experiment) and measurements of the photodisintegration of  $^3\text{He}$ . These measurements determined the momenta distributions of nucleon in these nuclei and explored the effect of the  $\Delta$  resonance in these reactions.

### **Other Experience**

Served as acting deputy group leader for P-25 for three months during a period when many safety issues were dealt with and was the chief author of our part of our Field Work Proposal (FWP) in 1999. Also, in the early 90's served P-2 as an informal acting deputy group leader, covering for our group leader whenever he was away on frequent travel.

Leading expert on UNIX computers and networks in the group, providing overall direction in the purchase and deployment of new computing resources, leadership in increasing the level of security and protection against hackers on our computers, deployment of third party software, reconfiguration of our computer resources and methods as the new LANL firewall went into place, and acting as a general resource to all members of the group and our visitors on computer related problems. About ten years ago, with the help of a few others, I moved the group onto (then) new very-fast UNIX based computers from older, slow VAX computers, and provided the necessary tools in the UNIX environment for everyone to get their work done efficiently.