

Keith Ruddick

Curriculum vitae

Born: December 2, 1939;
Haltwhistle, Northumberland, England.

Citizenship: British

Education: B.Sc., Birmingham University, England, 1961
Ph.D., Birmingham University, England, 1964

Positions Held: Research Associate, University of Michigan, 1964-66
Assistant Professor, University of Minnesota, 1966-70
Associate Professor, University of Minnesota, 1970-75
Professor, University of Minnesota, 1975-present

Societies: Graduate of the Institute of Physics
Member of the American Physical Society

Recent research activities:

a) Astroparticle physics at Soudan.

Understanding the structure and composition in the “knee” region of the primary energy spectrum is one of the important goals of modern cosmic ray physics. Is it due to production mechanisms and/or sources, to acceleration mechanisms, to galactic containment effects, etc.? We have built a range of detectors on the earth’s surface (Cherenkov counters, scintillation counters, and proportional tube arrays) to measure the primary energy of the cosmic rays and try to correlate the number and distribution of underground muons in Soudan 2 with this primary energy. So far, three graduate students have obtained Ph.D.s from this work: Vladimir Vassiliev (Ph.D. October 1997) is an Assistant Professor at the University of Utah; Leon Muallem (Ph.D. November 1998) is a post-doc at Minnesota; and Scott Wakely (Ph.D. November 1999) is a post-doc at the University of Chicago. One more Ph.D., Richard Gran, will result from the work in Fall, 2001.

b) MINOS detector design and construction

I was P.I. for the Minnesota design effort leading to a proposed liquid scintillator detector for MINOS. Our proposal was rejected by the collaboration in favor of the (much more expensive) solid scintillator detector that we are now constructing, but many of our ideas do, in fact, carry through and we at least have the satisfaction of having turned the collaboration towards the scintillation technique. A paper on our design of the liquid scintillation detector will appear in “Nuclear Instruments and Methods”, May 2001.

I am P.I. for the Minnesota scintillator production facility, which will produce half of the MINOS active detector components to be placed in the Soudan mine. We are on schedule! In addition, I am “quartermaster” for all MINOS module factories, (including CalTech and Argonne National Laboratory, where the rest of the active

detectors are being built), buying all the very large quantities of epoxies, tapes, vacuum sealants, etc., which are needed for construction.

Recent Papers:

A large liquid scintillator detector for a long baseline neutrino oscillation experiment
(with P. Border et al., Nuc.Inst.Meth., Section A, May, 2001)

CHESS: A rapid Cherenkov and electromagnetic shower simulator
(with V. Vassiliev et al., Astropart.Phys.13:87-105,2000)

Search for nucleon decay with final states lepton + η , $\nu\eta$, and $\nu\pi^0$
(with D. Wall et al., Phys.Rev.D62:092003,2000)

The atmospheric neutrino flavour ratio from a 3.9 kiloton year exposure of Soudan 2
(with W. W. M. Allison et al., in Phys.Lett.B449:137-144,1999)

Towards a new cosmic ray composition measurement in the knee using a dual air
Cherenkov array
(with S. P. Wakely et al, Proc., 26th Int. Cosmic Ray Conf. Vol. 3: 148-151)