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PERSONAL

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EDUCATION

12th FLUKA Course, May 2012

USPAS graduate level Free Electron Laser course, Jan 2003

USPAS Accelerator Physics course, Jan 2002

Michigan State University, East Lansing, MI
Ph.D. in Physics, June 1986
M.S. in Physics, June 1982

Kalamazoo College, Kalamazoo, MI
B.A. in Physics , June 1978

PHYSICS SKILLS

Accelerator Physics

- Second leading expert on g4beamline, a very widely used accelerator simulation program based on Geant4 that includes the interactions of particles with matter http:g4beamline.muonsinc.com
- wrote the rf_device package for g4beamline 2.10
- wrote a test space charge and virtualcone package for g4beamline
- wrote a number of ancilliary programs for g4beamline including kmimf, optim2g4blmodel, txt2blfieldmap, and makeuniformbunch
- wrote the retrack program to analyze the results of beam line simulations
- simulated many muon cooling beam channels and muon accelerators
- wrote, modified and maintained simulation software for the Center for Advanced Studies of Accelerators (CASA) at TJNAF, later for Muons, Inc. and the Muon Accelerator Program (MAP)
- rewrote software (tdbuu and matbbu) and performed calculations to predict beam

breakup thresholds for the superconducting RF cavities used in the TJNAF FEL and CEBAF accelerators
- simulated the effect of stray magnetic fields on beams in CEBAF experimental hall C
- participated in the CEBAF Energy Recovery experiment
- extensively rewrote and modified software to simulate the beam-beam interaction
- performed extensive simulations using that software for a proposed electron-ion collider
- designed, modeled, and constructed particle beamline components and transport systems (slits, monitors, magnets, targets)
- performed simulations using `PARMELA` to understand space charge effects in the Continuous Electron Beam Accelerator Facility (CEBAF) injector; modified same for use simulating CEBAF and FEL injectors

Particle Physics

- major collaborator in the ongoing Light Pseudoscalar and Scalar particle Search (LIPSS) experiment at Thomas Jefferson National Accelerator Facility's (TJNAF) 10kW Free Electron Laser (FEL)
- wrote and used the `lipssscan` program to translate, manipulate, and analyze LIPSS data in an attempt to create and detect dark matter
- worked with students participating in the LIPSS experiment

Aerospace

- supported many tests at the NASA Langley 14x22' wind tunnel
- unscrambled legacy FORTRAN and C code, wrote `splitcf` program to assist analysis
- modified and debugged a real time rotor control system for helicopter models
- developed a real time digital flapping resolver for helicopters
- repaired electronics

Nuclear Physics

- was a long term member of the CEBAF Large Acceptance Spectometer (CLAS) detector event reconstruction software group
- developed reconstruction software for the CLAS forward angle calorimeters
- was co-leader of the CEBAF hall C software group
- designed coincidence electronics and related software for a Moller Polarimeter measurement at the MIT Bates accelerator
- upgraded the calibration and control software for the Argonne National Lab/Notre Dame BGO ball detector at the ATLAS accelerator
- extensive simulation coding and use (Geant3, BOCKVI, etc.)
- low and high energy (0.1 MeV-4 GeV), light and heavy ion (e^--La^{139}), high spin, nuclear resonance fluorescence, gamma ray spectroscopy, and proton induced Xray research and analysis experience at numerous labs, including Wayne State University, Fermilab, National Superconducting Cyclotron Lab, Indiana University Cyclotron

Facility, Brookhaven National Lab, Lawrence Berekeley National Lab, Chalk River Nuclear Laboratories, Argonne National Lab and Jefferson Lab.
- designed, modeled, constructed and used gas, solid state, Cerenkov, and scintillation radiation detectors
- experience handling radioactive materials and working in radioactive environments

Teaching

- taught several undergraduate lecture and lab courses
- taught a graduate level lab course on nuclear techniques

COMPUTER AND ELECTRONICS SKILLS

Programming

- wrote and documented a variety of scientific software packages; some available at `http://casa.jlab.org/internal/code_library/code_library.shtml`
- wrote low level code to interface to CAMAC, FASTBUS, and VME hardware

Most Notable Programs

- `lipssscan` – manipulate and analyze data from the LIPSS dark matter search
- `kmimf` – generic model optimization tool for Unix and Cygwin/Windows programs
- `retrack` – manipulate, transform, and analyze output from `PARMELA`, `g4beamline`, `OptiM`, and `ICOOL` simulations of particle accelerators
- `sifter` - wind tunnel data analysis and conversion
- `dfr` - a realtime digital flapping resolver for helicopters
- `splitcf` - very powerful legacy code analyzer and documentation tool

Languages

- extensive structured FORTRAN, C, and C++ experience on many platforms
- Visual C++, HTML, Tk/Tcl, Perl, Java, QAL, DCL, BASIC, ALGOL, and CSMP experience

Data Acquisition Systems

- MCAs, NSCL-SARA, ORNL-HHIRF, ANL-DAPHNE, LAMPF-Q, CEBAF-CODA, VME-based, and EPICS

Operating Systems and Networks

- Ethernet and Appletalk network manager
- Linux, HP-UX, DEC-Ultrix, MS Windows, and Apple MacOS system manager
- UNIX: Linux, MkLinux, HP-UX, DEC-Ultrix, SunOS, IBM-AIX, VxWorks, CrayOS, DEC-OSF
- MS DOS, MS Windows, Apple MacOS, MacOSX

- DEC-VAX VMS and PDP-10, 11, RSX, Perkin-Elmer OS-32, IBM-MVS

Hardware

- RTL, TTL, CMOS, LSI, SCSI, EIDE, MBD, NIM, CAMAC, VME, and FASTBUS experience
- analog, digital, and PC board design and construction experience
- general electronics and electrical work
- general machine shop experience and training

RECENT EMPLOYMENT HISTORY

Oct 2007 – May 2012, Accelerator Physicist, supervisor T.J.Roberts
Muons, Inc., Batavia, IL

Feb 2001 – Sep 2007, Computer Scientist, supervisor D.Douglas
Thomas Jefferson National Accelerator Facility, Newport News, VA

Aug 1997 - Feb 2001, Systems Analyst, supervisor A.B.Graham
Computer Sciences Corporation, NASA Langley Research Center, Hampton, VA

Sep 1996 - Aug 1997, Assistant Professor of Physics, supervisor R. Gordon,
James Madison University, Harrisonburg, VA

PROFESSIONAL AFFILIATION

American Physical Society

PUBLICATIONS

A more detailed resume and complete publication list are available upon request or from: `https://userweb.jlab.org/~beard`

- 40 refereed publications
- 43 technical notes
- 15 automotive articles

REFERENCES

- Dr. Andrei Afanasev `afanas@gwu.edu` (202)994-8288
  Department of Physics, George Washington University, 2725 21st St, NW, Washington, DC 20052
- Dr. Keith Baker `oliver.baker@yale.edu` (203)432-6969
  Department of Physics, Yale University, 217 Prospect St., New Haven, CT 06511-8499
- Dr. Alex Bogacz `bogacz@jlab.org` (757)269-5784
  Thomas Jefferson National Accelerator Facility, Ste 704, 12050 Jefferson Ave., Newport News, VA 23606
- Dr. Jim Boyce `boyce@jlab.org` (757)269-7513
  Thomas Jefferson National Accelerator Facility, Ste 704, 12050 Jefferson Ave., Newport News, VA 23606
- Dr. Dave Douglas `douglas@jlab.org` (757)584-7512
  Thomas Jefferson National Accelerator Facility, MS 18, 12000 Jefferson Ave., Newport News, VA 23606