

Resumé

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Professional Objective

Develop scientific and technical ideas and systems in an environment which utilizes my strengths: creativity, analytical capability, vision, persistence, technical experience in electronic, mechanical and computing solutions, and a commitment to achieving goals.

Technical Specialties

Accelerators: Nearly two decades of experience with operation of high intensity proton accelerators and anti-proton storage rings. Member of team that designed, built, installed, commissioned and upgraded the Fermilab Main Injector and Recycler. Specified system to provide Main Injector current ramps which accommodate different maximum excitation while accounting for magnet hysteresis. Implemented collimation system to localize losses for the Main Injector which was 92% effective. Previously had five years experience in operation and upgrading the proton synchrotrons used in the 400 GeV experimental program at Fermilab. Member of commissioning team for the negative hydrogen injection system for the Fermilab Booster. Major revisions to resonant and single turn extraction systems in 400 GeV and 8 GeV accelerators. Orbit improvements to 8 GeV Booster Synchrotron.

Magnet Systems: Understand requirements for magnets used in accelerators, particle beam transport and particle physics experiments. Develop plans for materials selection and evaluation, magnet fabrication, measurement, installation or other features for magnets or systems. More than twenty-five years experience in analyzing and presenting data on magnet measurements including both conventional and superconducting magnets for accelerators, storage rings and particle beam transport. Evaluation of design and materials issues for hybrid permanent magnets. Magnet issues addressed include end field design of iron poles, hysteresis for various accelerator and beamline magnets, and hysteresis and time dependence of persistent current multipoles in superconducting magnets.

Magnet Measurement: Provided management and senior technical advice for development and operation of a series of production magnet measurement systems at Fermilab which measured a few thousand magnets. This included systems for the Tevatron (superconducting magnets), Anti-proton Debuncher and Accumulator (precise, large aperture fixed field electromagnets), Main Injector (fast ramping electromagnets), and Recycler (hybrid permanent magnets). A system utilizing a VAX computer with CAMAC and GPIB interfaces operated for more than 10 years, measuring more than 400 magnets for the Fermilab Anti-Proton Source (initial use) and more than 350 magnets of more than 50 designs in subsequent applications. Signals processed to provide measurements to better than 10 ppm. A system using VME-VXI data acquisition hardware and a SYBASE database has measured

more than 2000 magnets. It supports a wider variety of measurements, provides higher precision and employs a more standard tool set for data storage and retrieval. Measurement issues, including fundamental measurement limitations and measurement reproducibility, have been addressed and documented.

Mineral Oil Detector for Neutrinos: Coordinated team to study light production, transmission and detection in 800 tons of high purity mineral oil.

Calorimetric Detectors: Extensive experience in design, testing, assembly and operation of detectors based on lead-glass, lead scintillator and iron scintillator techniques for several experiments. Designed, fabricated, and operated a low cost, 50-ton water Cherenkov calorimeter based on an original design concept.

Gas Ionization Tracking Detector Systems: Designed and fabricated MWPC tracking system for major Fermilab experiments including Upsilon discovery. Directed electronic readout installation and debugging efforts. Assisted in design and operation of drift chamber or magnetostrictive spark chamber systems on four other major experiments.

Photomultipliers: High resolution pulse height measurements as required for the above calorimeter systems. Large arrays constructed for triggering, tracking systems, and Cherenkov Particle Identification system. Ultra fast timing techniques including a measurement with 40 ps resolution. Directed both mechanical and electronic efforts for above with arrays up to 400 photomultipliers.

Software System: Designed and helped implement the data acquisition, data analysis and data management systems for major magnet measurement projects. Attention to system modularity has provided maintainable software systems. Careful design of data storage files (VAX system) or database tables (VME - Sybase system) has aided in providing access for users. Complete, well documented design for data storage provided.

Research Interests

Elementary Particle Physics: Major discovery was the Upsilon family of particles (bottom quark) in dimuon production by protons. Searched for neutrino oscillation with Mini-BooNE detector. Have participated in a series of experiments to study structure of hadrons. Few and multiparticle hadron states have been explored to examine the nature of nucleons as revealed by hard scattering of constituents. Lepton final states have been studied as probes of electromagnetic structure of nucleons (charged constituent distributions) and search for new states. Also participated in experiments on polarized proton scattering, and decays of kaons and lambdas. Thesis experiment compared velocity of eV and GeV electromagnetic radiation to a few parts per million.

Physics of Magnets: Measured and analyzed hysteretic effects in iron dominated magnets for accelerator and beamline use. Analyzed field uniformity issues at low fields in iron-dominated dipoles. Provided original scheme to display hysteretic and saturation field effects. Studied effects which limit field uniformity of superconducting magnets, including analysis and experiments in persistent current effects and their time decay. For hybrid permanent magnets, examined issues of temperature compensation and time decay.

Creative Innovations

- Designed and built first water Cherenkov hadron calorimeter.
- Identified strategies for using passive correction techniques to reduce the effects of persistent currents on field uniformity of superconducting magnets.
- Invented system for using superconducting materials for magnetic shielding for accelerator and beam system magnets.

Leadership

Management: Many years as leader for group of ten and then thirty persons who operated magnet test facility for production magnet measurements (up to 50 magnets per week) and magnet R&D while developing new measurement capabilities. Supervisory responsibility for electronic, mechanical and programming personnel. Integrated this effort and supplied senior technical advice for other groups devoted to the same task.

Operations Support: Forty years experience in large group scientific collaboration. Extensive experience in providing training, operations bulletins and technical back-up to large operations groups with complex scientific systems. Followed wide variety of projects from problem identification and conceptual design through design, procurement and assembly to implementation and long term operation.

Education

Elementary and High School	Burns, OR	1950-1962
University of Rochester	Rochester, NY	1962-1966
B.S. in Physics with High Distinction		1966
University of California, San Diego	La Jolla, CA	1966-1973
M. S. in Physics		1969
PhD. in Physics		1973

Professional Experience

Teaching Assistant	U.C.S.D.	1966-1967
Research Assistant	U.C.S.D.	1967-1973
Research Associate	U. of Michigan	1973
Research Associate	Fermilab	1973-1976
Associate Scientist	Fermilab	1976-1982
Applications Physicist	Fermilab	1982-1985
Applied Scientist	Fermilab	1985-present

Awards

2000 Energy Management Achievement Award to Fermilab Recycler Team, In recognition of outstanding Energy Management in DOE Facilities

Professional Affiliations and Service

Member: American Physical Society

Senior Member: IEEE (Nuc and Plasma Sci Society, Magnetics Society)

Program Committee IEEE Nuclear Science Symposium 1981,83-86

Dep. Guest Editor for Trans. of IEEE Nuclear Science Symposium 1988

Member, Administrative Committee (AdCom) of IEEE NPSS 1997-2000

Chair, Particle Accelerator Science and Technology Committee,
IEEE NPSS 2001-2004

Organizing Committee for IEEE Particle Accelerator Conference 2003, 2005