Resources at Princeton U. Relevant to BABAR Drift Chamber Construction

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Some History

The Princeton high-energy-physics group grew out of the cosmic-ray group founded by J.A. Wheeler in 1946.

The present Elementary Particle Laboratory buildings housed faculty and students as well as staff and shops until 1968.

Early experiments led by G. Reynolds emphasized cosmic ray V-particles, observed in cloud chambers triggered by Geiger tubes on Mt. Evans, CO.

Early detector development:

– NaI(Tl), Hofstadter, '48.

– Liquid scintillator, Reynolds, '50.

– DC spark chamber (unstable), Keuffel, '50.

– Scintillating fiber, Reynolds, '57.

– Scintillating chamber + intensifed readout, Reynolds, '58.

Emphasis switched to accelerator physics with arrival of Treiman, Fitch, and Cronin, mid '50's, and startup of Princeton-Penn Accelerator.

Cronin led U.S. development of pulsed optical spark chamber in early '60's:

– CP violation

– Two neutrinos

Rapid-cycling bubble chamber at PPA, '63.

Devlin (+ Perez-Mendez, LRL) developed magnetostrictive spark chamber readout in mid '60's.

First use of drift chambers in '74 by Fitch (with ethylene!) at BNL, continuing at FNAL.

Large planar MWPC's and drift chambers at FNAL from mid '70's by McDonald, Smith and Shoemaker.

Two prototype cylindrical drift chambers for BNL E-787 in 80's by Louis, Marlow, Meyers and Smith (production versions from TRIUMF).

Straw-tube R&D for SSC by Lu and McDonald, early '90s.

Silicon detector upgrade at FNAL E-791 by Purohit, early '90s.

Straw-tube chambers for BNL E-787 by Marlow, Meyers, Smith and Shoemaker in '90s.

CCD pair spectrometer for SLAC E-144 by Bula, McDonald and Prebys, '94.

Straw-tube with cathode pad readout for Hera-B by Lu and Schwartz, '95–.

Glass RPC's for Belle by Liu, Marlow and Prebys (+ VPI), '95–.

Present Resources

Elementary Particles Lab Mechanical Group:

– Bill Sands, engineer

– Bill Groom, Bob Klemmer, Alan Nelson, machinists

Extensive experience in installing apparatus at BNL, FNAL, SLAC after construction at Princeton.

Mechanical design aided by AutoCAD and ALGOR (FEA).

Two assembly buildings with 7 milling machines (3 CNC), 5 lathes;

$16' \times 24' \times 11'$ Class-100 cleanroom, temperature and humidity controlled, ultra-low radon;

$15' \times 50' \times 9'$ assembly area with 1-ton crane;

Al and Fe welding.

Physics Department Mechanical Group:

– Ted Griffiths, engineer

– Glenn Atkinson, Bill Dix, Les Vargas, machinists

Department machine shop, ‘student’ shop,
Forrestal machine shop (remnant of PPA shop)
including large Lucas horizontal boring machine;

$50' \times 50 \ \times 30'$ high-bay area on Jadwin B-level with 20-ton crane.

Civil Engineering Department:

J.-H. Prévost, author of FEA program DYNAFLOW on UNIX machines.

D.B. Billington, expert on domes; book: *Thin Shell Concrete Structures*.