FOCUS Beamline and Spectrometer

FOCUS uses a photon beam from bremsstrahlung of a 300 GeV beam of electrons and positrons. The electrons and positrons were produced using an 800 GeV proton beam extracted from the Fermilab Tevatron.

The energy of the photon beam for triggered events range from 50 to 300 GeV with a mean of 180 GeV. The angular spread of the beam is about 1 mrad at the experimental target.

The energies of the incident beam electrons and positrons are measured before bremsstrahlung using 5 planes of silicon microstrip detectors, and again after bremsstrahlung with a shower detector. An electromagnetic calorimeter near the end of the spectrometer measured the energy of uninteracted photons.

The key to separating clean charm signals from non-charm background in FOCUS is the precision voltage reconstruction using 16 planes of silicon microstrip detectors. The charm decay vertex is required to be detached from the production vertex. To further improve signal-to-background we can also require the decay vertex to be outside of the target.

Particle identification is important to isolate and distinguish between different charm signals. Hadron identification is provided by a multi-cell threshold Cerenkov counters. Muon identification is given by 2 muon detector systems and an inner and outer electromagnetic calorimeter allowing identification and reconstruction of electrons, photons and π±.

FOCUS trigger detects when beam photons have hadron producing interactions. So electromagnetic conversions are rejected. This is done with scintillators in the target region, two scintillator hodoscopes downstream of the target and a hadronic calorimeter. 6.5×10^6 events were collected in FOCUS producing 1 million fully reconstructed charm decays.

Some Other Recent FOCUS Results

- Search for T Violation in Charm Meson Decays, hep-ex/0506012.
- Study of Λ_c Cabibbo-Favored Decays Containing a Baryon in the Final State, hep-ex/0505077.

FOCUS Collaboration Institutions:
- University of California, Davis; CBPF, Brazil; CINVESTAV, Mexico; University of Colorado, Boulder; Fermi National Accelerator Laboratory, Batavia; LNF and INFN Frascati, Italy; University of Guanajuato, Mexico; University of Illinois, Urbana-Champaign; Indiana University, Bloomington; Korea University, South Korea; Kyungpook National University, Korea; INFN and University of Milano, Italy; University of North Carolina, Asheville; University of New Mexico, USA; University of Tennessee, Knoxville; Vanderbilt University, Nashville; University of Wisconsin, Madison.