III.G3a. PHOTOPRODUCTION AT TEVATRON ENERGIES

B. Conforto, INFN, Florence, Italy

A first-generation experiment to search for $B\bar{B}$ pairs would be a straight-forward extension to Tevatron energies of a hybrid photoproduction experiment (WA 58) that has recently taken data at CERN using emulsions and the Ω magnetic spectrometer. Each emulsion (50 × 200 × 0.6 mm^3 in volume) is exposed to a photon beam with 10^6 tagged γ's ($20 < E\gamma < 70$ GeV). The emulsion makes an angle of 5° with the beam direction in such a way that the thickness crossed by the beam is 6 mm (20% RL). The number of pairs from converted γ's does not represent a problem and could probably be increased by a factor of two. In WA 58,600 plates were exposed and out of 160 plates scanned 7 double and 3 single charm candidates were found.

A 10,000 plates exposure at the Tevatron with very modest beam requirements ($10^6\gamma$/pulse-200 hours) would give ~30 $B\bar{B}$ pairs assuming a photoproduction cross section of 3 nanobarns at an average energy of ~300 GeV.

In WA 58 we find a trigger + reconstruction + scanning efficiency ~30% so that a realistic estimate would be ~10 $B\bar{B}$ pairs seen. The main problem is how to look for 10 events out of 10^6 hadronic triggers. Results from CESR presented at the Madison conference give an average multiplicity of 5.9±0.5 for B decays. The average multiplicity for events at incident energies of ~300 GeV is 15 so that the presence of a $B\bar{B}$ pair should be clearly indicated by a dramatic increase in multiplicity. Of course the experiment is only feasible with an excellent downstream spectrometer capable of handling such high multiplicities. With an average length of 3 mm/track and assuming a γ factor of 30 the emulsion can explore lifetime ranges (5×10^{-15} → 5×10^{-13}) so that such a technique would not as a rule allow one to see the sequential decay B → charm since the charm particle would usually decay outside the emulsion. A test is currently underway at CERN to see whether it is possible to detect and eventually to trigger charm decays outside the emulsion using two telescopes of silicon detectors.