Summary Report for the Special Triggers Group

J. D. Bjorken
Fermilab
Batavia, Illinois, 60510

A. J. Slaughter
Yale University
New Haven, Connecticut, 06511

The charge of the special triggers group was to discuss data acquisition and triggering for everything except the generic 4π detector. Clearly this was too big a topic for a four-day workshop so the following topics were identified and subgroups formed based on the interests of the participants:

1. Jet spectrometer - G. Theodosius, N. Giokaris, J. Bensinger
2. Total cross section and elastic scattering - K. Foley
3. Muon triggers at small angles - D. Green
4. Secondary vertex issues - J. Anjos, R. Lipton, P Shephard
5. Forward Spectrometers - J. Bjorken, D. Christian, B. Knapp, J. Lach
6. Very high luminosity/ low rate experiments - K. Heller

7. Silicon detectors in the generic 4π detector -F. Bedeschi, S. Belforte, A. Bross, G. Chilarelli, M. Dell'orso, C. Haber, P. Peterson, J. Slaughter
8. External neutrino experiments - R. Gustafson, I. Leedom, M. Cummings, M. Crisler

A number of reports from the subgroups are included in the proceedings. Note that, in contrast to the situation with the generic 4π detector where the Snowmass design set limits and parameters, most of the discussions here began by defining the parameters of the detector before moving on to data acquisition.

Some of the conclusions of the subgroups are:

1. The regions of phase space not covered by the generic 4π detector deserve open geometry, quality detectors. The different mass scales have quite different requirements on rate and physical space from the demands of the generic 4π detector. In particular, the questions of lattice design and IR layout raised by these experiments are time critical in the SSC design process. The contributions by K. Foley and J. D. Bjorken discuss several such experiments.
2. The data acquistion and computing demands of jet spectrometers and forward spectrometers are not grossly different in complexity, scale or nature from those of the

generic 4π detector with the possible exceptions that 1)the extension in space-time of the primary data acquisition process can be very large, and 2)the luminosity will in most cases be lower. [1,2]

3. The potential of "forward" spectrometers for intrinsic B physics is very exciting.[2,3] The rate is there and the secondary vertex recognition in planar geometries is feasible. This should be a good topic for Snowmass 86.
4. With regards to vertex detectors in the generic 4π detector, it appears that the data could be available as soon as a microsecond after a level 1 trigger. The amount and type of data generated by such detectors do not appear to pose any unusual problems that could not be handled by the data acquisition systems described by the other working groups. The most pressing issues with respect to secondary vertex detection appear to be more physics specification of where it would be useful and Monte Carlo work on algorithms using the proposed geometries. The work done for CDF, SLD, etc., data from the SppS, and data from the Fermilab fixed-target program would be good places to start. We recommend a group concentrate on this at Snowmass 86.
5. The contribution by D. Green discuses muon triggering at small angles.

6. The group discussing specialized "external" detectors in the forward region concentrated on two designs. I. Leedom worked on a "neutrino detector" which would be centered around the scattered beam as it exits from the interaction region. A reasonable design, 60 meters in length using 1000 tons of iron absorber placed 200 m from the interaction region, would have about 300K detector elements. The apparatus would also serve as a neutral heavy particle decay detector. M. A. Cummings, M. Crisler, and R. Gustafson worked on the construction of a neutral beam from the interaction region to sample photon and neutral hadron physics in the zero-angle region.

References

1. N. Giokaris et al., these Proceedings.

2. J. D. Bjorken, "Forward Spectrometers at the SSC", these Proceedings.

3. J. Cronin, in Proceedings of the 1984 Summer Study on the Design and Utilization of the Superconducting Super Collider, p. 170, FNAL, (1984).