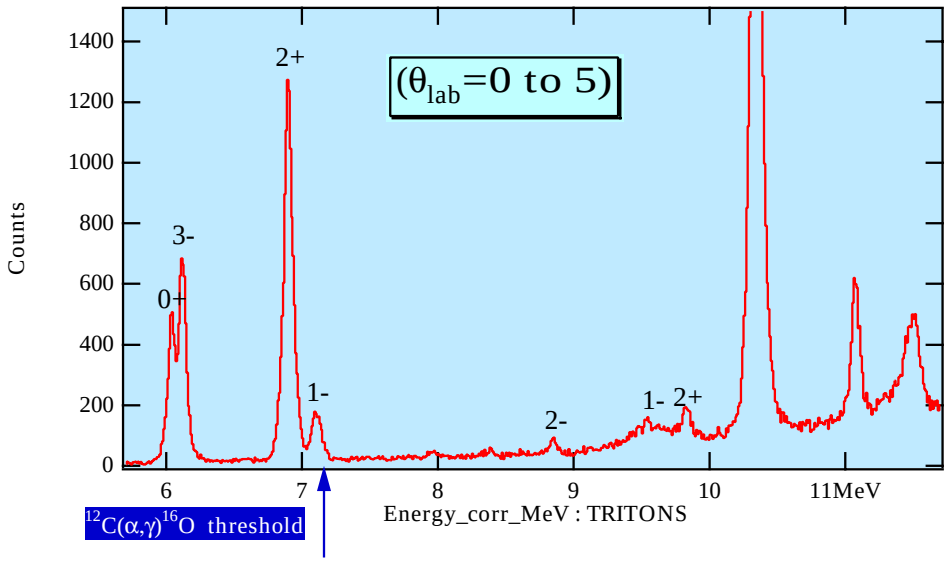
S800 OPERATIONS

D. Bazin

A total of 10 experiments have been completed on the S800 spectrograph this year. Almost all of these experiments involved not only the standard focal plane detection system, but also some additional detectors located around the target and in the S800 beamline for tracking. The most complex, as far as detection systems are concerned, were experiments 96016 and 97003 which studied the structure of ^{17}C and ^{10}Li via (d,p) reactions in inverse kinematics. For these two experiments detectors in addition to the focal plane were a silicon array at backward angles in the target chamber, two tracking detectors (CRDCs) in the intermediate chamber and a PPAC in the production chamber. Other experiments such as the study of giant resonances involved the BaF2 array of Oak Ridge.

A test experiment realized in collaboration with T. Nakamura in which two particles were detected simultaneously in the focal plane. For this purpose, the scintillators were replaced by a multi-segmented hodoscope composed of 15 interleaved plastic scintillators, and the position detectors (CRDCs) were operated in double-hit mode. Focal plane multihit capability was demonstrated when two ^{4}He events from the breakup of ^{9}Be were successfully observed.



With such a heavy load of experiments, there has been only minor improvements on the hardware side (ECL-readout electronics implemented on the FERA digitizers for the CRDCs, fast roughing of the target chamber, and other minor changes). On the other hand, the reconstruction of trajectories has made significant progress over the year. A solid procedure has been put in place to produce inverse maps at any Bρ setting of the spectrograph. A more detailed description can be found in the report on reconstruction. As an example, the figure above shows a final spectrum obtained after correction for the aberrations of the spectrograph up to 5^{th} order, and the kinematics for the reaction $^{12}C(^{7}Li,^{3}H)^{16}O$ at 19 MeV/u. The resolution obtained is 60 keV, which corresponds to 1 part in 2,200 in energy. The target thickness limits the maximum resolution to 1 part in 4,000 in this experiment. The two clearly separated states labeled 2^{+} and 1^{-} are of prime importance in the study of the reaction $^{12}C(\alpha,\gamma)^{16}O$ which occurs in stars near the

end of their lives. Further progress to reach the 1 part in 10,000 is forseen in the future with improved models of the magnetic fields.