Experiment 05038

Study of the diffractive component in the one-proton knockout of $^9$C
Goals of the experiment

- Knockout reactions: sudden removal of one or two nucleons from the projectile by a light target (\(^9\text{Be}\))
  - Direct reaction
  - Two reaction mechanisms
    - Stripping: removed nucleon interacts with target
    - Diffraction: removed nucleon elastically scattered
  - In most experiments, only the heavy residue is detected
  - Relative contributions of each mechanism unknown experimentally
- Detect removed proton in \(^9\text{C}\) one-proton knockout reactions to single out diffraction
Experimental setup

- S800 + HiRA
  - S800 to detect $^8$B residue
  - HiRA to detect proton in coincidence
- $^8$B has no bound excited state
  - Initial and final states well known
HiRA setup

- 10 telescopes at 17 cm from target covering between 10° and 60° in the lab
- Detect high energy protons (100 MeV)
  - No ΔE detectors
  - Energy loss in E detectors: 2 MeV
  - Punch-through energy for CsI: 110 MeV
Expected rates

- Radioactive $^9$C produced from 150 MeV/u $^{16}$O
- Incoming rate 2000 $^9$C/s/pnA
- Cross sections 40 mb stripping 14 mb diffraction
- About 10 S800+HiRA coincidences per second

Three $B\rho$ values to cover $^8$B parallel momentum