

# RADIATIVE CAPTURE

## PROTON RADIATIVE CAPTURE AT $E_p = 150$ MeV

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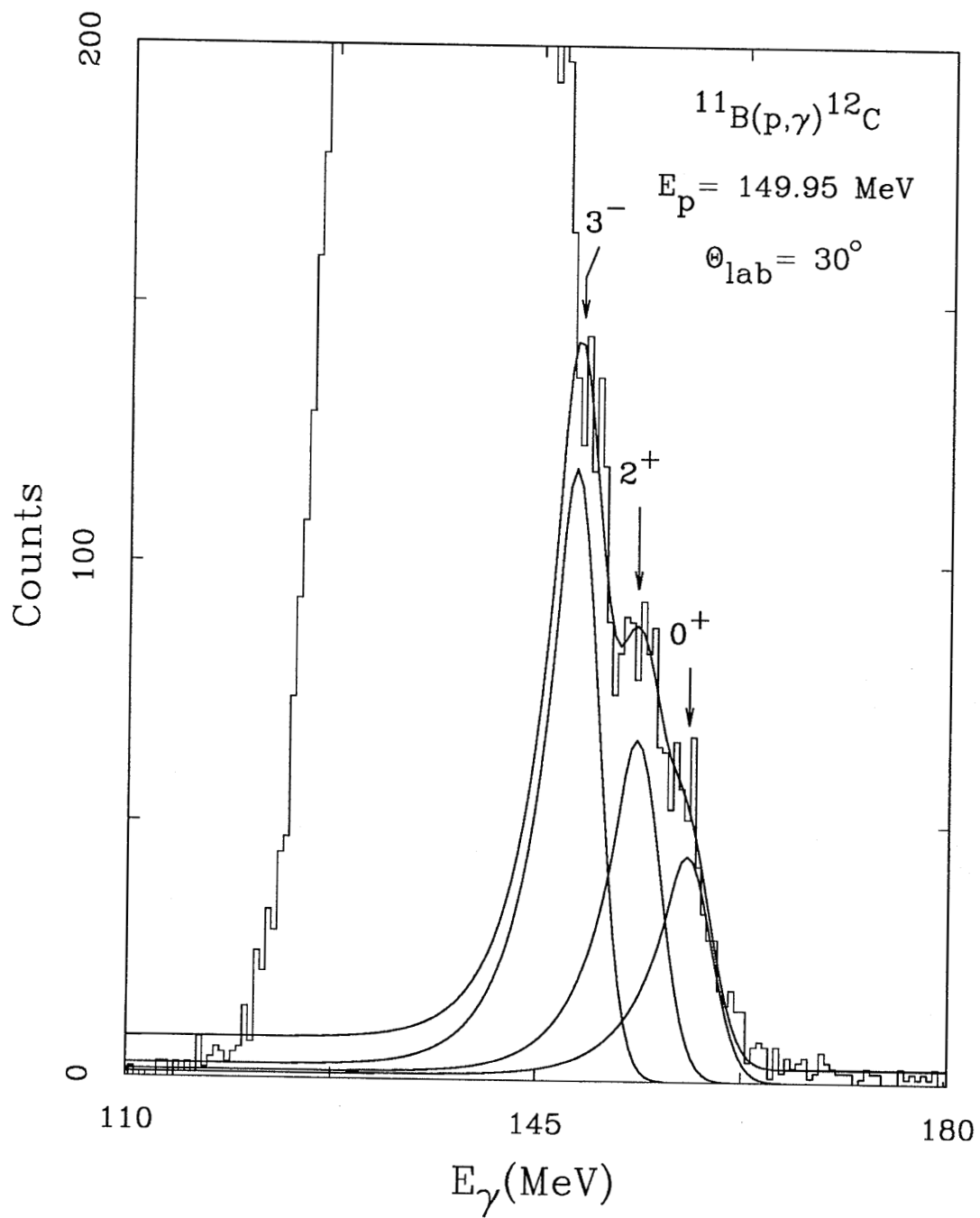
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Recently there has been a revival of theoretical interest in modeling radiative capture reactions in the energy range from 100 MeV to the region of the  $\Delta$  resonance near 300 MeV. Previous theoretical attempts to describe the  $^{16}\text{O}(\gamma, p_0)$  results of Leitch et al.<sup>1</sup> between 100 and 400 MeV met with little success. The newer treatments of the capture reaction which utilize Dirac phenomenology and meson-exchange terms have had greater success in fitting the angular distributions and energy dependence of the Leitch results. The decision to pursue radiative proton capture in the range of 100-200 MeV was motivated by the possibility of measuring spin-dependent analyzing powers which should present a more stringent test of the newer models than cross-section data alone.

During 1987, we performed a series of measurements of the  $^{11}\text{B}(p, \gamma)^{12}\text{C}$  reaction at 150 MeV using a new detector system built around a 29 cm diameter by 38 cm long NaI crystal and designed for detecting  $\gamma$ -rays with energies up to 200 MeV. A spectrum of  $\gamma$ -rays from the  $^{11}\text{B}(p, \gamma)$  reaction is shown in Fig. 1. Utilizing our empirically-determined line shape, captures populating the ground and two excited states can be resolved at  $E_\gamma \sim 150$  MeV. Differential cross sections and analyzing powers were measured at only two angles at that time. The relativistic calculations by J.P. McDermott<sup>2</sup> are in reasonably good agreement with this preliminary data. Currently the detector system is awaiting the installation of a  $^6\text{Li}$  neutron shield.

1. M.J. Leitch, J.L. Mathews, W.W. Sopp, C.P. Sargent, S.A. Wood, D.J.S. Findlay, R.O. Owens, and B.L. Roberts, *Phys. Rev. C* **31**, 1633 (1985).
2. J.P. McDermott, private communication.



**Figure 1.** Spectrum of  $\gamma$ -rays from the  $^{11}\text{B}(p,\gamma)^{12}\text{C}$  reaction at  $E_p = 150 \text{ MeV}$ . The detector angle is  $30^\circ$ .