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High Resolution Spectroscopy of the $^{12}_{\Lambda}$B Hypernucleus Produced by the (e,e'K) Reaction

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High Resolution Spectroscopy of the $^6_B$ Hypernucleus Produced by the (e,e'K$^+$) Reaction

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High energy CW electron beams at new accelerator facilities allow electromagnetic production and precision study of hypernuclear structure and we report here on the first experiment demonstrating the usefulness of the (e,e'K$^+$) reaction. This experiment is also the first to take advantage of the enhanced virtual photon flux available when electrons are scattered at approximately zero degrees. The observed resolution, $\sim 900$ keV, of the $^6_B$ spectrum is the best yet attained using magnetic spectrometers. The positions of the major excitations are in agreement with theoretical predictions and the previous binding energy measurements.
The experimental view plan showing both the kaon spectrometer (SOS) and the electron spectrometer (ENGE) spectrometer.
Missing mass spectrum obtained from CH$_x$ Target at incident electron energy of 1864 MeV

\[ \text{Yield (Counts/1.0 MeV)} \]

\[ E_e = 1864 \text{ MeV} \]

\[ p(e, e'K^+)\Lambda/\Sigma^0 \]
The summed $^{12}_\Lambda$B missing mass spectrum
Conclusions:

- First kinematically complete Hypernuclear Electroproduction demonstrated
- Resolution superior to hadronic processes
- \((e,e'K^+)\) complementary to \((K^\pm,\pi^\pm)\) and time reversed channels
- Will possibly encounter need for explicit inclusion of quarks
- Need to continue these unique studies at unique place