INTRODUCTION

The present summary represents an updating of the theoretical study begun by G.N. Epstein and myself /1/; this work is still in progress and is now being undertaken in collaboration with J.H. Koch. Our primary focus is on electromagnetic interactions with nuclei (involving either real or virtual photons), where kaons are produced and the final state is a bound hypernucleus. That is, we are interested in $X(\gamma, K)_Y^\Lambda$ and $X(e, e'K^)_Y^\Lambda$ reactions involving nuclear targets $X$ and final-state hypernuclei $Y^\Lambda$ (or possibly $Y^\Sigma$), as indicated in Fig. 1.

Figure 1. Diagrams for photo- and electro-production of kaons from nuclei ($X$) leading to hypernuclei ($Y^\Lambda$). The electro-production reaction, $X(e, e'K^)_Y^\Lambda$, is treated in the one-photon-exchange approximation.

The basic features of such studies are indicated schematically in Fig. 2.
The elementary process in this specific example involves a proton target with the \((\gamma, K)\) or \((e, e'K)\) reaction initiating the hadronic transition \(p\rightarrow\Lambda^0\). For the many-body situation shown in the lower part of the figure additional complications arise: (1) the same elementary process occurs, now possibly modified by the presence of the other nucleons in the nucleus; (2) the outgoing kaon can be rescattered in the nuclear medium before exiting from the final-state hypernucleus; (3) the initial and final states are not just free-space \(p\) and \(\Lambda^0\) wave functions, but now involve many-body nuclear and hypernuclear wave functions. We take as given a simple model for the elementary process (see the next section) and focus mainly on these three basically nuclear physics problems.

Before proceeding to specific results let us place the discussion in context by listing various hadronic and electromagnetic processes involving nucleon-to-hyperon transitions (see Table I).