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Single- and multi-nucleon K^- interactions with nuclei near threshold

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Six recent SU(3) chiral-model EFT approaches to the $\bar{K}$-nucleon interaction are constrained by K^-p low-energy scattering and reaction data and by the kaonic hydrogen SIDDHARTA experiment. However, the resulting K^-N scattering amplitudes turn out to be strongly model-dependent when extrapolating to energies below threshold. The models studied predict widely different amplitudes for neutrons also above threshold.
Strong-interaction observables in kaonic atoms depend on K^--nucleon interaction below threshold. Good agreement with the world-data on kaonic atoms is achieved with the above models only when $\bar{K}N$ amplitudes are supplemented by phenomenological multi-nucleon terms.
Branching ratios for absorption-at-rest of K^- mesons on nuclei, from old bubble chamber experiments, are used as additional data in the analysis of kaonic atoms. The results unequivocally favor only two of the above six models, thus it is possible for the first time to base on experiment the relative strengths of state-of-the-art single-nucleon and multi-nucleon terms in the K^--nucleus potentials. The nuclear densities that are being probed by these experiments are also well defined.
From potentials that fit both conventional data on kaonic atoms and branching ratios of single-nucleon absorption-at-rest we are able to make some general statements on low-energy K^- interaction with nuclei.

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