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Microscopic model of K^-NN absorption and its application in kaonic atoms calculations

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This contribution reports on our recently developed microscopic model for an antikaon absorption on two nucleons in nuclear matter [1]. The absorption is described within a meson-exchange picture and the primary K^-N interaction strength is derived from the state-of-the-art chiral coupled channel meson-baryon interaction models. The medium modification of the K^-N scattering amplitudes were taken into account and the crucial role of in-medium effects was confirmed. The K^- single- and two-nucleon absorption fractions and branching ratios for various mesonic and non-mesonic absorption channels were calculated. The results are in very good agreement with experimental data from old bubble chamber experiments as well as with the latest results from the AMADEUS collaboration.
The model was applied in calculations of kaonic atoms. The energy shifts and widths were calculated for 23 nuclear targets and corresponding $K^-N + K^-NN$ potentials were confronted with kaonic atom data. The description of the data significantly improves when the two-nucleon absorption is considered. Finally, a phenomenological term describing three- and four-nucleon processes was added to the microscopic $K^-N + K^-NN$ potentials and its parameters were fitted to the data.

References:
[1] J. Hrtankova and A. Ramos, Phys. Rev. C 101 (2020) 035204.

Collaboration

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