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The final frontier of the low-energy kaon-nuclei interactions studies: the AMADEUS program

The AMADEUS collaboration has the goal to perform unprecedented measurements in the field of the low-energy charged kaons - nuclei interactions, by implementing the existing KLOE detector with a dedicated setup in the inner region. As a preliminary step towards the realization, the AMADEUS team has analyzed the existent 2002-2005 KLOE data, studying the processes resulting from the negative kaons nuclear absorption in the entrance wall of the KLOE Drift Chamber (containing mostly carbon) and in the gas filling it, mostly helium. Processes containing Λ -p and Λ -d in the final state were looked for, together with the search for the “ $\Lambda(1405)$ ” going in the both neutral and charged Σ - π channels. These analyses already produced unique results, proving the possibility to obtain, for the first time, invariant mass spectra of the $\Lambda(1405)$ for all the possible decay channels. This was possible thanks to the excellent features of the KLOE detector, including an excellent photon detection of its calorimeter. In addition to these results, other interesting effects like the Σ - Λ internal conversion could be investigated. Based on this very promising results, a dedicated-pure carbon target was built and inserted inside the KLOE Drift Chamber in August 2012 in order to perform a clear measurement in a well known material in controlled kinematic conditions. Results on both 2002-2005 and 2012 data will be shown, together with the next steps of the AMADEUS experiment.

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