

Study of the $\Lambda(1405)$ resonance through its neutral and charged decay channels by AMADEUS at DAΦNE

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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 [1] detector with a dedicated setup in the inner region. The KLOE detector at DAΦNE [2] represents a unique opportunity to perform a complete study of the $\Lambda(1405)$ resonance through all its three $\Sigma\pi$ decay channels. The importance of these measurements rely on the possibility to compare the different results for the various decay channels [3][4][5], investigating their contributions to the final resonance shape. In particular, one of the main difference between the neutral and charged $\Sigma\pi$ channels is the presence of a second resonance, the $\Sigma(1385)$, whose contribution to the final $\Lambda(1405)$ spectra has to be evaluated and subtracted. Very promising and interesting results have been already obtained for the $\Sigma^0\pi^0$ decay channel [6] to which, for isospin selection rules, the $\Sigma(1385)$ resonance can not decay, while from the $\Sigma^+\pi^-$ decay channel analysis, all the possible processes (resonant/non-resonant, in-flight/at-rest) contributions to the final invariant mass spectrum could be understood and analysed. To improve the understanding of all these processes, a dedicated pure carbon target was built and inserted inside the KLOE Drift Chamber in August 2012, with the aim to perform a data taking under controlled conditions, i.e. in pure carbon and with the target thickness optimized such as to have a fraction of stopped kaons about a factor 20 more than in the 2004-2005 data. Results of the analyses on both 2004-2005 and 2012 data will be presented, together with the future plans of the AMADEUS collaboration.

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