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Kaonic atoms studies at DAFNE: from SIDDHARTA-2 to future perspectives

Monday, 4 December 2023 13:00 (1 hour)

The DAFNE collider at INFN-LNF is a unique source of strangeness (low-energy kaons) in the world, it delivers a low-momentum (< 140 MeV/c) nearly monochromatic charged kaon beam, ideal for experimental studies of low-energy kaon-nucleon/nuclei interactions. Using the experience gained with SIDDHARTA experiment, which achieved the most precise kaonic hydrogen measurement of the 1s level shift and width to date, new X-ray studies focused on kaonic deuterium are ongoing in the framework of the SIDDHARTA-2 experiment, with the goal to determine the isospin dependent scattering lengths, which is only possible by combining the K-p and the upcoming K-d results. The experimental challenge of the kaonic deuterium measurement is the very small x-rays yield, the even larger width (compared to kaonic hydrogen) and the difficulty to perform x-rays spectroscopy with weak signals in the high radiation environment of DAFNE. It is therefore crucial to develop a new large area X-rays detector system to optimize the signal and to control and improve the signal-to-background ratio by gaining in solid angle, increasing the timing capability and as well implementing an additional charge particle tracking veto systems. An overview of the experimental improvements, the status and plans of SIDDHARTA-2 and future perspectives to measure other kaonic atom systems at the DAFNE collider will be given.

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