

# HADRONIC ATOMS PHYSICS AT DAΦNE

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The unique features of the low momentum, low hadronic background  $K^-$  beams produced at DAΦNE  $\phi$ -factory were immediately recognized as very promising for the study of kaonic exotic atoms, and the DEAR proposal was put forward in 1995 [1]. The objective of DEAR was: i) to demonstrate the feasibility of performing on DAΦNE exotic atoms research; ii) to measure with high precision the X-ray  $K_\alpha$  line shift and width, due to the strong interaction, in kaonic hydrogen. The aim is a precision determination of the antikaon-nucleon isospin dependent scattering lengths, fundamental quantities in understanding the low energy QCD and its chiral symmetry breaking mechanism, contributing, for example, in obtaining the kaon nucleon sigma terms. The DEAR program ended in 2002, not only demonstrating the feasibility of the research program by measuring the kaonic nitrogen X-ray transitions, but also producing the, up to now, most precise measurement on kaonic hydrogen [2]. The success of DEAR prompted to further exploit the possibilities offered by DAΦNE in hadronic atoms physics with a more sophisticated apparatus allowing to select the X-rays transitions from kaonic atoms formation by means of triggerable X-ray detectors: the Silicon Drift Detectors (SDD). The objective of the new experiment, SIDDHARTA (Silicon Drift Detector for Hadronic Atom Research by Timing Application) is the eV precision measurement of the X-ray  $K_\alpha$  line shift and width in kaonic hydrogen and a similar measurement, for the first time, in kaonic deuterium [3]. SIDDHARTA represents the natural continuation of DEAR, which takes advantage of a completely new designed setup, having as detector the triggerable large area silicon drift detectors allowing an increasing of the signal/background ratio of orders of magnitude with respect to DEAR.

After a review of the results obtained by DEAR, the status of SIDDHARTA will be presented, outlining the achievements obtained in beam tests of SDD-prototypes and the prevision of the results achievable with SIDDHARTA.

- [1] C.Guaraldo *et al.*, The DEAR Proposal: DAΦNE Exotic Atom Research, **LNF-95/055(IR)**, 1995.
- [2] G.Beer *et al.*, Phys. Rev. Lett. **94** (2005) 212302.
- [3] C.Guaraldo *et al.*, in Proceedings of the 5th Italy-Japan Symposium, Naples, Italy, November 3-7, 2004, p. 285.

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