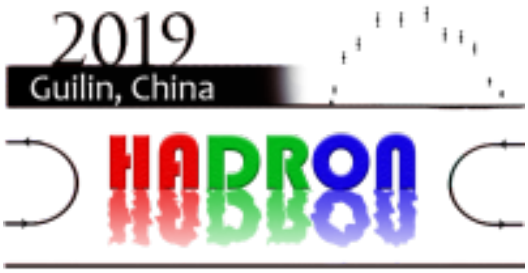

Contribution ID: **80** Type: **Parallel**

Studying strong interaction at DAFNE and J-PARC

Sunday, 18 August 2019 14:25 (20 minutes)

Studies with kaonic atoms offer the unique opportunity to perform experiments at vanishing relative energies between the antikaon and the nucleon, because their atomic binding energies are in the keV range, far below the lowest energies of extracted beams for scattering experiments. Of particular interest are kaonic hydrogen atoms, because they offer an ideal framework to study strong-interaction processes, which will give access to the basic low-energy parameters, like the antikaon-nucleon scattering lengths.

The antikaon hydrogen reaction is well understood from the recent results obtained from KpX at KEK, DEAR and finally from SIDDHARTA at DAFNE, along with theoretical calculations based on these results. An appropriate framework to describe antikaon nucleon interaction at low-energy is Chiral Effective Field Theory (ChEFT), a systematic approach describing the interactions of the pseudo-scalar Nambu-Goldstone bosons amongst each other and with baryons. At present, there are no lattice QCD calculations of antikaon-nucleon scattering lengths, although a theoretical framework has been proposed.

The importance of antikaon deuterium atom X-ray spectroscopy has been well recognized, no experimental results have yet been obtained due to the difficulty of the X-ray measurement. The planned antikaon deuterium experiment at Laboratori Nazionali di Frascati (Italy) and at the Japan Proton Accelerator Research Complex (J-PARC, Japan) will be described, including first test measurements at J-PARC with the new developed X-ray spectroscopy device.

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Session Classification: Session 7: Hadrons in hot and nuclear environment including hypernuclei

Track Classification: Session 7: Hadrons in hot and nuclear environment including hypernuclei