STUDYING STRONG INTERACTION WITH SIDDHARTA

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In light exotic hadronic atoms the Bohr radius is still much larger than the typical range of strong interaction formulated in QCD, and the average momentum of the bound hadron is very small. For light atoms, especially for hydrogen atoms, a detectable energy shift of the ground state has been found (with respect to the pure QED value), as well as an observable broadened ground state level, caused by nuclear absorption. By measuring these observables, the s-wave kaon-nucleon scattering lengths at zero energy could be extracted, which are sensitive measures of the chiral and isospin symmetry breaking pattern in QCD. With SIDDHARTA at DAFNE (Laboratori Nazionali di Frascati) the strong interaction induced shift of the ground state of kaonic hydrogen atoms and the absorption width were measured, with best accuracy up to now. In addition a first attempt was taken to determine the shift and width of kaonic deuterium. Measurements of the 2p shift and width of kaonic helium completed the SIDDHARTA programme. An overview of the results obtained with SIDDHARTA will be presented as well as a description of the SIDDHARTA apparatus. Finally, the proposed upgrade of SIDDHARTA, with the main purpose to measure kaonic deuterium, will be described. This work was partly supported by the LEANNIS network of the European project HadronPhysics2 of the seventh framework programme and the SIDDHARTA joint research activity of the European project HadronPhysics of the sixth framework programme.

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