

Physics of multistrange systems with antiprotons

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Stored antiprotons beams in the GeV range represent a unparalleled factory for hyperon-antihyperon pairs. Their outstanding large production in antiproton collisions will open the floodgates for a series of new studies of strange hadronic systems with unprecedented precision: For the first time, high resolution γ -spectroscopy of doubly strange nuclei will be feasible, thus complementing measurements of ground state decays of double hypernuclei with mesons beams at J-PARC or particle decays of these nuclei in heavy ion reactions. The behaviour of hyperons and – for the first time – antihyperons in nuclear systems can be studied under well controlled conditions. High resolution spectroscopy of multistrange Ξ and Ω atoms will become feasible. Thus, the first measurement of a spectroscopic quadrupole moment of a hadron will come within reach which would be a benchmark for our understanding of hadron structure. Secondary elementary scattering experiments with momentum tagged hyperons and antihyperons will open a whole new field for the study of baryon-baryon interaction. All these measurements are not not only interesting by themselves but they are also highly relevant for other fields of nuclear physics: for example antihyperons in nuclear matter and strange baryon scattering data are an important input for the interpretation of strongly interacting hadronic matter in heavy ion reactions.