A cornucopia of antineutrons and hyperons

from super J/ψ factory[†]

Abstract

We point out and investigate a new method for obtaining high-quality beams of antineutrons and Λ, Σ and Ξ hyperons and their antiparticles. Our method is based on a super J/ψ factory with capability of accumulating trillions of J/ψ decays each year. In the relevant J/ψ decays the desired particle is produced together with other final state particles that can be tagged. This allows accurate determination of the flux and momentum of the projectile, enabling unprecedented precision-study of the corresponding interactions with a broad range of targets. These novel high-statistics sources of baryons and antibaryons with precisely known kinematics open fresh opportunities for applications in particle and nuclear physics, including antinucleon-nucleon interaction, nonvalence $s\bar{s}$ component of the nucleon, (anti)hyperon-nucleon interaction, OZI violation, (multi-strange) hypernuclei, exotic light hadron spectroscopy and many others, as well as calibration of Monte Carlo simulation for hadronic and medical physics.

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