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Performance studies of strangeness production in central Pb-Pb collisions at sNN = 8.8 GeV with the NA60+ experiment at the CERN SPS

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The NA60+ experiment is designed to study the phase diagram of strongly interacting matter by measuring thermal dimuons, charm, and strange particles produced in ultra-relativistic heavy-ion collisions. NA60+ will be installed at the CERN SPS, allowing an energy scan in the range sNN−−−−√~5–17 GeV and studying a region of high baryonic density little explored so far. The apparatus will be formed by a vertex telescope and a muon spectrometer. The vertex telescope will consist of layers of large area and ultra-thin state-of-the-art Monolithic Active Pixel Sensors (MAPS), which offer excellent spatial resolution with a low material budget. The vertex telescope will allow the production of strange particles, such as ϕ, K0S, (anti-)Λ0, Ξ±, and Ω± to be studied through exclusive reconstruction of hadronic decay channels. The enhancement of strangeness production is a direct probe of the quark-gluon plasma formation in ultra-relativistic heavy-ion collisions. The ϕ, Ξ±, and Ω± are composed respectively of ss¯, d¯s¯s¯ (dss) , and s¯s¯s¯ (sss) quarks. Therefore, they are ideal probes to study strangeness production. Moreover, previous measurements of ϕ production performed by the NA49 and NA50 experiments at the SPS, respectively in the K+K− and μ+μ− decay channels, showed a large discrepancy. NA60+ could measure both decay channels, shedding light on this puzzle. The K0S and (anti-)Λ0 are also a probe for the study of strangeness production. Since they are more abundantly produced in Pb-Pb collisions compared to other hyperons, they can also be used to test the baryon production models by measuring their yield ratios. In this talk, I will present the expected performances for the measurement of the ϕ, K0S, (anti-)Λ0, Ξ±, and Ω± production in central Pb-Pb collisions at sNN−−−−√=8.8 GeV, using the vertex spectrometer to reconstruct their hadronic decays respectively into K+K−, π+π−, pπ− + c.c., Λ0(pπ−)π− + c.c, and Λ0(pπ−)K− + c.c.

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