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Performance studies of strangeness production in central Pb-Pb collisions at $\sqrt{s_{NN}} = 8.8$ 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 $\sqrt{s_{NN}} = 4-17$ 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 , K^0_S , (anti-) Λ^0 , Ξ^\pm , and Ω^\pm 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^\pm , and Ω^\pm are composed respectively of ss^\pm , $d^\pm s^\mp s^\mp$ (dss), and $s^\mp s^\mp s^\mp$ (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 $\mu^+\mu^-$ decay channels, showed a large discrepancy. NA60+ could measure both decay channels, shedding light on this puzzle. The K^0_S and (anti-) Λ^0 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 , K^0_S , (anti-) Λ^0 , Ξ^\pm , and Ω^\pm production in central Pb-Pb collisions at $\sqrt{s_{NN}} = 8.8$ GeV, using the vertex spectrometer to reconstruct their hadronic decays respectively into K^+K^- , $\pi^+\pi^-$, $p\pi^- + c.c.$, $\Lambda^0(p\pi^-)\pi^- + c.c.$, and $\Lambda^0(p\pi^-)K^- + c.c.$

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