Contribution ID: **115** Type: **Invited**

Unexpectedly large violation of isospin symmetry in nucleus-nucleus collisions at CERN SPS energies

Tuesday, 30 June 2026 12:00 (30 minutes)

NA61/SHINE at the CERN SPS is a multipurpose fixed-target detector for charged and neutral hadron measurements. The research program of the experiment includes studies of strong interactions as well as reference measurements for neutrino and cosmic-ray physics. A significant advantage of NA61/SHINE over collider experiments is its extended coverage of phase space available for hadron production. This includes the nearly entire forward hemisphere for charged hadrons and additionally a large part of the backward hemisphere for specific neutrals, with no cut-off at low transverse momenta.
This talk presents the recent NA61/SHINE measurements of an unexpectedly large violation of isospin symmetry in the kaonic sector of multiparticle production. An excess of charged over neutral kaon production in Ar+Sc collisions at $\sqrt{s_{\rm NN}}$=8.8 and 11.9 GeV is observed, reaching (18.4±6.1)% at mid-rapidity at the higher energy. Although with much larger error bars, experimental data from other experiments confirm the NA61/SHINE results. The effect cannot be explained by theoretical models including known sources of violation of isospin symmetry. Future plans for studies of the system size and energy dependence of this phenomenon in charge-symmetric hadron-nucleus and nucleus-nucleus collisions will also be discussed.

Collaboration

NA61/SHINE

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Session Classification: Plenary session

Track Classification: Tests of fundamental symmetries and precision experiments