Researchers observe enhanced yield ratio between strange and nonstrange open-charm mesons

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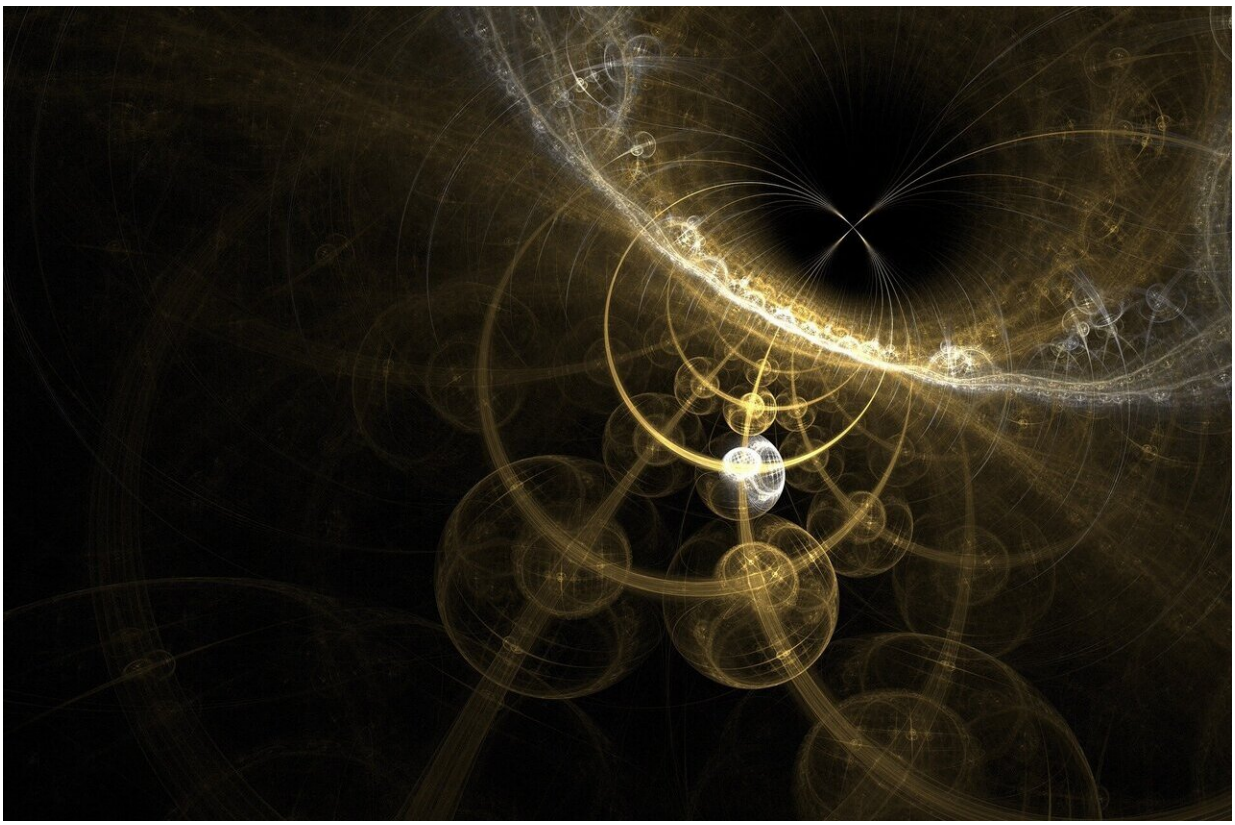

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Researchers from the University of Science and Technology of China (USTC) of the Chinese Academy of Sciences, together with

international collaborators, observed an obvious enhancement in the yield ratio between strange ($Ds^{\pm}$) and nonstrange (D^0) open-charm mesons compared to PYTHIA simulations for p + p collisions. This study was published in *Physical Review Letters*.

Temperature and energy densities were extremely high shortly after the Big Bang that created the universe. Under such circumstances, the quark-gluon plasma was formed (QGP), in which quarks and gluons constrained by hadrons became the degrees of freedom. The $Ds^{\pm}$ consists of a charm quark and a strange antiquark, and the D^0 is made of a charm quark and a light antiquark.

In this study, the Relativistic Heavy Ion Collider (RHIC), the first machine in the world capable of colliding heavy ions at relativistic speeds, helped researchers create conditions close to the Big Bang.

The measurement of $Ds^{\pm}/D^0$ based on the Au + Au collisions at center-of-mass energy of 200 GeV which were collected by the STAR experiment showed notable enhancement compared to the values of PYTHIA simulations of p + p collisions. The results verified the composition of $Ds^{\pm}$ and D^0.

This study ensures the coalescence hadronization mechanism of charm quarks through the formation of open-charm hadrons and shows the leading role QGP plays in $Ds^{\pm}$-meson production.

More information: J. Adam et al, Observation of $Ds^{\pm}/D^0$ Enhancement in Au+Au Collisions at sNN=200 GeV, *Physical Review Letters* (2021). DOI: 10.1103/PhysRevLett.127.092301

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