RESEARCH

A NEW MEASURING SYSTEM FOR THE INTERACTION BETWEEN ORDINARY AND STRANGE MATTER

The international collaboration of the ALICE experiment at CERN's LHC accelerator, to which INFN makes a significant contribution, has developed and applied a new technique for measuring the strong interaction that regulates the interaction between hadrons. Called femtoscopy, because it concentrates on sizes in the order of the femtometre (10^{-15} metres), the technique is based on the quantum principle that links the impulse difference of particles that are not very far apart to their interaction. Its application to LHC collisions has enabled the collaboration to measure, for the first time, the attraction owing to the strong interaction existing between a proton and the heaviest of the hyperons, the Ω particle: a "strange" particle consisting of three strange quarks. The work was published in the Nature issue of 9 December. In the future, using the LHC as a particle "factory", the methodology will be adopted in studying the interaction dynamics of any pair of hadrons. In addition, another interesting application concerns the understanding of the state of matter that composes the nucleus of neutron stars. Because of the high pressure that characterises these stars, it is hypothesised, in fact, that inside them hyperons can also be produced, since, in these conditions, it is energetically favourable for matter to be in the strange quark form, as in well as the up and down quark form, which constitute ordinary matter. The future measurements of interactions between ordinary matter (protons) and strange matter (hyperons) using femtoscopy could, therefore, be an essential piece for developing equations on the state of neutron star matter and in determining their evolution over time. ■