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Femtoscopic Coulomb and strong final state interactions in Fourier space

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Femtoscopy provides a means to explore the space-time structure of the particle emitting source in heavy-ion collisions, and had a fundamental role in the discovery of the Quark-Gluon-Plasma (QGP) created in such collisions. Work continues on the ever-increasing data sets to infer more and more details about the source function. In the past years a novel method was developed that enables the fast and reliable calculation of the effect of Coulomb final-state interaction on Bose-Einstein correlation functions. It relies on the Fourier transform of the assumed source function, and is mathematically interesting on its own, as well as faster and more robust than a direct calculation. In this talk a development of the method will be presented that is applicable to three-dimensional (i.e. not spherically symmetric) sources as well as to s-wave strong interaction wave functions. In this way, the new method will augment measurements that utilize three dimensional source functions. A pivotal application is Levy-type source functions; such ones have recently been increasingly successful in the description of correlation functions, as well as opened up interesting new physics questions. The new method (and the opportunity it offers to reliably use a broad range of source functions) will also help ongoing investigations of the strong interaction between various particle types using identical and non-identical correlations.

Auteur principal: Dr NAGY, Marton (Eötvös Loránd University)

Orateur: Dr NAGY, Marton (Eötvös Loránd University)