

## Hadron tomography in meson-pair production and gravitational form factors

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Generalized parton distributions (GPDs) are important 3D structure functions for hadrons, and they are used to solve the proton spin puzzle. The  $s$ - $t$  crossed quantities of the GPDs are generalized distribution amplitudes (GDAs), and they can be studied in the two-photon process which is accessible at KEKB. The GDAs describe the amplitude from quark-antiquark to the hadron pair. In 2016, the Belle collaboration reported measurements for pion pair production in the electron-positron collision, and the pion GDAs can be obtained by analyzing the Belle data. In this talk, we explain the basic properties of the pion GDAs for explaining the cross section of the pion-pair production. In our analysis, the pion GDAs are expressed by a few parameters, which are determined by the fitting the Belle data. From the obtained GDAs, the form factors of energy-momentum tensor are calculated for pion in the timelike region. In order to study the gravitational radius for the pion, the form factors of energy-momentum tensor are obtained in the spacelike region by using the dispersion relation. Then, the mass radius is calculated as 0.56-0.69 fm for the pion by using the spacelike form factors. This is the first study on gravitational form factors and mass radius of hadrons from actual experimental measurements. In 2018, Belle II will begin to collect data with the higher luminosity Super KEKB, so that the GDAs of other hadrons should also be investigated in the near future. Our studies are valuable in understanding the 3D structure and gravitational properties of hadrons.

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