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Large-acceptance isotope identification array FAZIA: Status and R&D activities for upgrade

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The FAZIA apparatus is a multi-detector array designed to identify a wide range of charge and mass of reaction products in heavy-ion collisions in the Fermi energy domain. The basic module of FAZIA is the block, consisting of 16 three-layer telescopes. The first two layers are highly homogeneously doped Si detectors with the thickness of 300 μm and 500 μm , respectively, and the third layer is a 10 cm thick CsI(Tl) scintillator read out by a photodiode. The detector signals are extracted in real-time based on the digital signal processing implemented on the FPGAs. The recent experiments demonstrated that the charge could be discriminated up to more than $Z=54$ using the ΔE -E technique and the pulse shape analysis. In addition, the isotopic discrimination has been achieved up to $Z \sim 25$ with the ΔE -E technique and up to $Z \sim 20$ with the pulse shape analysis in the silicon layer. Recently, there have been activities for the FAZIA detector upgrade to use thicker and thinner silicon layers for enlarging the kinematic coverage. In addition, the R&D is in progress to make the front-end electronics board more compact and versatile. In this talk, we present the current status of the FAZIA detector and some highlights of the R&D activities for the upgrade.

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