

Perfectoid signature and an application to étale fundamental groups

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In positive characteristic, the F -signature can be viewed as a quantitative measure of F -regularity – an important class of singularities central to the celebrated theory of tight closure pioneered by Hochster and Huneke, and closely related to Kawamata Log Terminal (KLT) singularities via standard reduction techniques from characteristic zero. In this talk, based on joint work with Hanlin Cai, Seungsu Lee, Linqun Ma and Karl Schwede, we introduce a mixed characteristic analogue of the F -signature using the perfectoidization functor of Bhatt-Scholze. As an application, we show it can be used to provide an explicit upper bound on the size of the étale fundamental group of the regular locus of BCM-regular singularities – a class of singularities introduced by Ma and Schwede relating to both F -regular & KLT singularities. This result is akin to bounds in equal characteristic (which can be shown using the F -signature), and relates to work by Xu, Braun, Carvajal-Rojas, Schwede and many others.