(英訳)

I have been studying quotient singularities in positive characteristic. A quotient singularity is a singularity that appears in a quotient variety divided by an action of a finite group on a smooth variety, and is fundamental class of singularitites. It is known that quotient singularities behave well in characteristic 0. For example, it is known that quotient singularities are log terminal in the classification used in minimal model program. I have focused my research on Batyrev's theorem, which is one of the results on quotient singularities in characteristic 0. The theorem states that if a Gorenstein quotient singularity in characteristic 0 has a kind of resolution, called crepant resolution, then the Euler characteristic of the smooth variety obtained by the crepant resolution coincides with the number of conjugacy classes of the acting finite group. Although crepant resolution does not exist in general, it has been shown that the existence of a crepant variety for Gorenstein quotient singularities of dimension three or less by Roan, Ito, and Markushevich. Bridgeland, King, and Reid have shown the existence of crepant resolution and Batyrev's theorem for variety of dimension three or less using a categorical argument.

The starting point of my research was to see that Batyrev's theorem could be extended in positive characteristic, but it is known that Batyrev's theorem does not hold in positive characteristic. So my new goal was to improve Batyrev's theorem so that it would hold for positive characteristic as well. One of the most promising ways to do so is the wild McKay correspondence proved by Yasuda, which states the stringy motive is an invariant that coincides with the value of the motivic integration on the moduli space of G torsors. This is a generalization to positive characteristic of a result proved by Batyrev and Denef-Loeser for characteristic 0. Since the stringy motive is an invariant with a lot of information such as the class of its singularities, obtaining this computation method is important for studying singularities. In addition, there is a discrete version of the wild McKay correspondence in which the stringy point-count coincide with the weighted count of the etale extension of the local field. By applying this to a quotient variety determined by the premutation action of an n-th order symmetric group on a 2n-dimensional affine space, the Serre-Bhargava mass formula has been obtained. I verified the Euler characteristic of crepant resolution from different point of view by applying it to the quotient singularity, which is a counterexample to Batyrev's theorem that I had already obtained. The v-function needed to compute the weighted counting are consistent with the age function of matrices and the Artin conductor in representation theory in characteristic 0. So it is also worthwhile to compute this for various representations from the point of view in number theory. In this counterexample, the value of the v-function for the action of a symmetric group is computed for the first time in the weighted counting of the etale extension of a local field.