Research Plan

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My research plans are as follows:

(1) Classification of singular toric Fano varieties

A convex lattice polytope is called a *Fano polytope* if it contains the origin in its interior and every vertex is primitive. There is a one-to-one correspondence between toric Fano varieties and Fano polytopes. In particular, there is a bijection between toric log del Pezzo surfaces and Fano polygons, which are called *LDP-polygons*. By using this correspondence, Dais classified toric log del Pezzo surfaces with unique singular points. I extended this classification to toric log del Pezzo surfaces with exactly two and exactly three singularities. I will classify certain singular toric Fano varieties in higher dimensions.

(2) Toric Fano varieties with positive second Chern characters

We say that a nonsingular complete toric variety X is ch_2-*positive* if the intersection number $(\mathrm{ch}_2(X)\cdot S)$ is positive for any subsurface $S \subset X$, where $\mathrm{ch}_2(X)$ is the second Chern character of X. We conjectured that the only ch_2-positive nonsingular complete toric varieties are projective spaces. Jointly with Sano and Sato, we showed that the conjecture holds true if either X is a toric Fano variety of dimension ≤ 8 or the fan satisfies a certain local condition. We will continue this research.