

# Motives, modularity, and mirror symmetry

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## **Abstract**

We consider certain families of Calabi-Yau orbifolds and their mirror partners constructed from Fermat hypersurfaces in weighted projective spaces. We use Fermat motives to interpret the topological mirror symmetry phenomenon. These Calabi-Yau orbifolds are defined over  $\mathbb{Q}$ , and we can discuss the modularity of the associated Galois representations. We address the modularity question at the motivic level. We give some examples of modular Fermat motives. We then formulate a modularity conjecture about rank 4 Fermat motives that there exist Siegel modular forms on some congruence subgroups of  $\mathrm{Sp}(4, \mathbb{Z})$ .