

## SMOOTHING TORIC FANO THREEFOLDS

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**Abstract:** Laurent Inversion (LI) is a smoothing construction designed to find mirror pairs in the Fano case. Given a Laurent polynomial  $f$  supported on a 3D Fano polytope  $P$ , let  $X_P$  be the associated toric Fano threefold. The general LI construction then embeds  $X_P$  inside an ambient toric variety  $F$ . If in addition  $X_P$  is a complete intersection defined by line bundles on  $F$ , taking a general section gives a variety  $X$  which degenerates to  $X_P$ . The goal is for  $X$  to be as smooth as possible.

The principal motivation for these constructions is the following: there is a conjectured one-to-one correspondence between certain deformation families of Fano varieties and equivalence classes of polytopes. Using this information, one can state a precise version of the mirror theorem for Fano varieties. In the context above, this directly translates to  $f$  being the mirror of  $X$ .