Milnor fibers and symplectic fillings of quotient surface singularities

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Let $(X, 0)$ be a germ of a normal surface singularity which may be always assumed to be embedded in an affine space $(\mathbb{C}^N, 0)$. If B is a small ball centered at the origin, then a small neighborhood $X \cap B$ of the singularity is contractible and is homeomorphic to the cone over its boundary $L := X \cap \partial B$. The smooth compact 3-manifold L is called the link of the singularity. Perhaps one of the most active areas of current researches in 4-manifold theory is to classify the possible symplectic fillings of L, that is, symplectic 4-manifold with the boundary L satisfying certain compatibility conditions with the natural contact structure on L. On the other hand, the Milnor fiber of a smoothing of the singularity, i.e., a nearby fiber of a smoothing of the singularities, has a natural Stein (and hence symplectic) structure, and so provides a natural example of such a filling.

In this series of lectures, we review basics on smoothings/symplectic fillings of quotient surface singularities, and minimal model program of 3-fold. Then I will explain some recent joint work (with Heesang Park, Jongil Park, and Giancarlo Urzúa) on an explicit algorithm using the 3-fold Mori theory for identifying Milnor fibers with symplectic fillings of quotient surface singularities.

- Lecture 1 (5/15(금) 10:30–12:00): Surface singularities and Milnor fibers
- Lecture 2 (5/21(목) 10:30–12:00): P-resolutions and Milnor fibers
- Lecture 3 (6/04(목) 10:30–12:00): Weighted homogeneous surface singularities
- Lecture 4 (6/11(목) 10:30–12:00): Minimal model program
- Lecture 5 (6/12(금) 10:30–12:00): Identifying Milnor fibers