

Symplectic resolutions for symplectic singularities

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Roughly speaking, a symplectic singularity is a complex algebraic variety W , smooth in codimension 1, such that there exists a holomorphic symplectic form on its smooth part. A resolution of singularities $\pi : X \rightarrow W$ is called symplectic if X admits a holomorphic symplectic form. One can show that π is symplectic if and only if π is crepant.

Some examples of symplectic singularities are : (1) quotient singularities V/G , where V is symplectic and G is a finite group of symplectic automorphisms; (2) nilpotent orbit closures in a semi-simple complex Lie algebra.

We will first discuss the existence and non-existence of symplectic resolutions for these examples. Then some results on the uniqueness, the finiteness and deformations of symplectic resolutions for a symplectic singularity will be explained. Finally we will give some explicit examples and point out some questions for future studies on this topic.