On 81 symplectic resolutions of a 4-dimensional quotient by a group of order 32

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In a joint project with Jarosław Wiśniewski we study the symplectic quotient singularity $\mathbb{C}^4/G$ where G is a certain matrix group with 32 elements, generated by Dirac matrices. The existence of a symplectic resolution of this singularity was proved by Bellamy and Schedler in [3] by non-constructive methods based on Poisson deformations. We give a construction of all its symplectic resolutions using the theory of the Cox rings, see [1]. The structure of the Cox ring of a resolution X of $\mathbb{C}^4/G$ can be determined without knowing any explicit description of X. Then one may obtain all the resolutions as GIT quotients of the spectrum of the ring $\mathrm{Cox}(X)$.

A motivation for this work is a possibility of using the results in the framework of the generalized Kummer construction, see [2]. This might lead to finding new compact hyperkähler manifolds.

References

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[3] G. Bellamy, T. Schedler, *A new linear quotient of C4 admitting a symplectic resolution*, Math. Z. 273, 2013, no. 3-4, 753–769.