

Noncommutative Auslander Theorem and noncommutative quotient singularities

Ji-Wei He

Hangzhou Normal University

Email: jwhe@hznu.edu.cn

Let k be an algebraically closed field of characteristic zero. Let G be a small subgroup of $\mathrm{GL}(n, k)$, and let $S = k[x_1, \dots, x_n]$ be the polynomial algebra. Then G acts on S naturally. There is a natural isomorphism of algebras $S * G \cong \mathrm{End}_{S^G}(S)$, where $S * G$ is the skew group algebra, and S^G is the fixed subalgebra of S . This result is usually called Auslander Theorem (cf. [1, 2]). Auslander Theorem was generalized to noncommutative settings (cf. [3, 4]). In this talk, I will report some progresses in noncommutative Auslander Theorem, and their applications to noncommutative McKay correspondence (cf. [9, 5, 6]) and noncommutative resolutions for singularities (cf. [8, 10]). Some progress on singularities of noncommutative quadric hypersurfaces are also included in this talk (cf. [11, 7]).

REFERENCES

1. M. Auslander, *On the purity of the branch locus*, Amer. J. Math. **84** (1962), 116–125.
2. M. Auslander, *Rational singularities and almost split sequences*, Trans. Amer. Math. Soc. **293** (1986), 511–531.
3. Y.-H. Bao, J.-W. He, J.J. Zhang, *Pertinency of Hopf actions and quotient categories of Cohen-Macaulay algebras*, J. Noncomm. Geom. **13** (2019), 667–710.
4. Y.-H. Bao, J.-W. He, J.J. Zhang, *Noncommutative Auslander Theorem*, T. Amer. Math. Soc. **370** (2018), 8613–8638.
5. K. Chan, E. Kirkman, C. Walton, J.J. Zhang, *McKay Correspondence for semisimple Hopf actions on regular graded algebras I*, J. Algebra **508** (2018), 512–538.
6. D. Chan, E. Kirkman, C. Walton, J.J. Zhang, *McKay Correspondence for semisimple Hopf actions on regular graded algebras II*, J. Noncomm. Geom. **13** (2019), 87–114.
7. J.-W. He, Y. Ye, *Clifford deformations of Koszul Frobenius algebras and noncommutative quadrics*, arXiv:1905.04699.
8. O. Iyama, M. Wemyss, *On the noncommutative Bondal-Orlov conjecture*, J. Reine Angew. Math. **683** (2013), 119–128.
9. I. Mori, *McKay-type correspondence for AS-regular algebras*, J. London Math. Soc. **88** (2013), 97–1117.
10. X.-S. Qin, Y.-H. Wang, J.J. Zhang, *Noncommutative quasi-resolutions*, J. Algebra **536** (2019), 102–148.
11. S. P. Smith, M. Van den Bergh, *Noncommutative quadric surfaces*, J. Noncommut. Geom. **7** (2013), 817–856.