Koszul Calculus of Preprojective Algebras

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It is a joint work with Rachel Taillefer (arXiv:1905.07906). A Koszul calculus was introduced and developed in [1] for associative algebras defined by homogeneous quadratic algebras. We study the Koszul calculus of preprojective algebras. We prove that a Poincaré duality is valid for these algebras. This duality is new when the algebra is not Koszul, showing how Koszul (co)homology can be drastically different to Hochschild (co)homology in the non-Koszul situation. In general, a Calabi-Yau property adapted to the Koszul complex is defined for any quadratic quiver algebra, in terms of derived categories, and a Poincaré Van den Bergh duality is deduced from this property.

References

[1] Roland Berger, Thierry Lambre, Andrea Solotar *Koszul calculus*, Glasg. Math. J., 2018.