

# Operads with compatible CL-shellable partition poset admit a Poincaré–Birkhoff–Witt basis.

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## Abstract

In 2007, B. Vallette built a bridge across posets and operads by proving that an operad is Koszul if and only if the associated partition posets are Cohen–Macaulay. Both notions of being Koszul and being Cohen–Macaulay admit different refinements: our goal here is to link two of these refinements. We more precisely prove that any (basic- set) operad whose associated posets admit isomorphism-compatible CL-shellings admits a Poincaré–Birkhoff–Witt basis. Furthermore, we give counter-examples to the converse (this is a joint work with Joan Bellier-Millès and Eric Hoffbeck).