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Plane bipolar orientations and quadrant walks

Mireille Bousquet-Mélou *

bousquet@labri.fr

Our understanding of planar maps has evolved a lot since the early enumerative results of Tutte, obtained via a recursive approach in the sixties. Thirty years later, the simplicity of his formulae was at last understood at a combinatorial level, and the underlying bijections then paved the way to the study of large random maps, seen as metric spaces.

For maps equipped with an additional structure, many questions remain open. In this talk, we consider planar maps equipped with a bipolar orientation, and show that they have a very rich combinatorial structure, related, among other topics, to lattice walks confined to cones. This allows us to count them, both recursively and bijectively, and to exhibit various universal properties of these structures.

Joint work with Éric Fusy and Kilian Raschel.

*LaBRI, CNRS, Université de Bordeaux, 345, cours de la Libération, 33405 Talence Cedex, FRANCE