Monoids and Combinatorics

From quasi-crystal graphs to hypoplactic monoids of various types

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A first notion of quasi-crystal graph was proposed by Cain and Malheiro, from which the hypoplactic monoid can be obtained. Cain and Malheiro asked whether this definition could be reformulated to allow a generalization of the hypoplactic monoid as Kashiwara crystals led to a generalization of the plactic monoid, and whether quasi-Kashiwara operators could be defined recursively.

In this talk we answer these questions by proposing a notion of quasi-crystals that gives rise to a new definition of quasi-crystal graphs. We show that quasi-crystals admit a tensor product that for Cartan type A_n results on a new construction of the hypoplactic monoid. This approach can be applied to other types. Based on this framework, we present some results for the hypoplactic monoid of type C_n.