

Centro de Investigação em Matemática e Aplicações
Departamento de Matemática
Programa de Doutoramento em Matemática

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CRYSTALS FOR PLACTIC-LIKE MONOIDS

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Abstract: Kashiwara's crystal graphs carry a natural monoid structure given by the identification of words labelling vertices that appear in the same position of isomorphic components of the crystal. Fixing the type A_n crystal basis, this monoid is the celebrated plactic monoid, whose elements can be identified with Young tableaux. The crystal graph and the so-called Kashiwara operators interact with the combinatorics of Young tableaux and with the Robinson-Schensted correspondence providing combinatorial tools to work with them.

In this talk we will present an analogous 'quasi-crystal' structure for the hypoplactic monoid, the sylvester monoid and the Baxter monoid, whose elements can be identified with quasi-ribbon tableaux, binary search trees, and pairs of twin binary search trees, respectively.

As in the plactic case, the quasi-crystal structure and the associated quasi-Kashiwara operators do nicely interact with the combinatorics of the corresponding combinatorial objects (quasi-ribbon tableaux, binary search trees, and pairs of binary search trees) and with the corresponding version of the Robinson-Schensted correspondence.

We will explain the relation between the crystal graph of the plactic monoid and the quasi-crystal graph, and exemplify how the quasi-crystal structure can be applied to prove some new results about these monoids. We end the presentation discussing new perspectives and some open problems.

This is joint work with Alan Cain (CMA-UNL).



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