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Francois Bergeron* (bergeron.francois@uqam.ca). *Algebraic combinatorics and finite reflection groups*.

The last years have seen an explosion of research activity at the frontier between Algebraic Combinatorics, Representation Theory, and Algebraic Geometry, with interesting ties with Knot Theory and Theoretical Physics. For a broad audience, we are going to explain why this interaction has been very fruitful, and has raises new intriguing questions in the areas concerned. We will try to give a flavor of results obtained, techniques used, and of the large number of open questions that are still open, and why we should care about all this.

Among the main combinatorial objects at play in this story are generalizations to arbitrary rectangles, of the classical Dyck paths. It is well known (since Euler) that these are counted by the Catalan numbers. Closely linked objects are the so-called Parking Functions. On the algebraic side of the story, one of the important player is the bigraded \mathbb{S}_n -module of diagonal harmonic polynomials for the symmetric group \mathbb{S}_n . It is conjectured that an adequate enumeration of Parking Functions associated to classical Dyck paths, furnishes an explicit combinatorial formula for the bigraded character of these modules. This is know as the Shuffle Conjecture, which has now been greatly extended to deal with the rectangular context. (Received August 20, 2014)