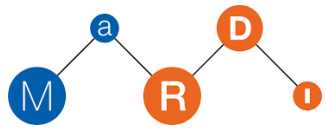
Partial Algebraic Shifting

Antony Della Vecchia

Joint work with F. Lenzen and M. Joswig

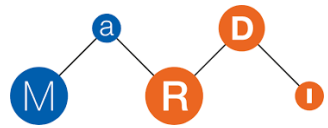
TU Berlin

ICMS Mathematical Research Data 2025-06-03



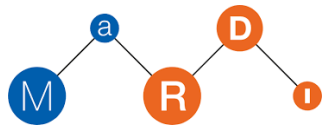
Algebraic Shifting motivation

- f vector and betti number
- near cone
- classifying betti and f vector sequences
- rigidity?



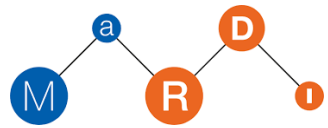
Algebraic Shifting constructions

- shifted families
- explain the change of basis algorithm
- mention monte carlo and issues with finite characteristic



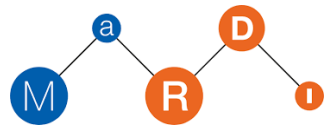
different perspectives

- GIN
- plucker
- pick one and spell it out



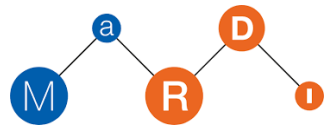
Partial Algebraic Shifting

- loose definition as a way to replace the generic matrix with a matrix that is parametrized by weyl group elements
- state result about standard n cycle



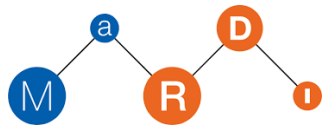
LU decomposition and Bruhat decomposition

- $\Delta_{gb}(K) = \Delta_g(K)$ for any upper triangular b
- $w_0 g = lu = w_0 u' w_0 u$ (bring the two decompositions together)
- $u' w_0$ uses only $\frac{1}{2} n(n-1)$ transcendentals, can we do better?



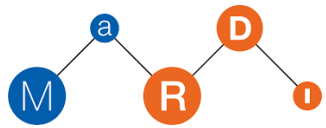
Inversions and Rothe matrix

- Want a normal for Bw where B has minimal transcendentals.
- define inversions and show an example of how we we can remove transcendentals on the left.
- example of how to create a rothe matrix in Oscar



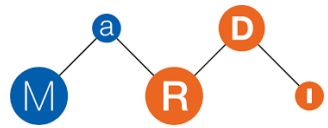
Real Projective Plane Example

- show example of how we can compute projective plane with standard n cycle
- computations inspired us to find result
- example shows that our result is tight



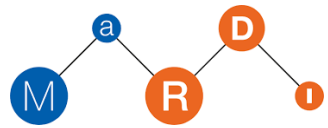
Near cones

- definition of near cone
- State lemma about shifting to near cones



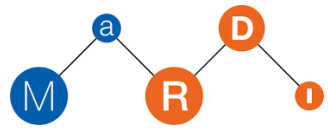
Shifting to Near cones proof

- sketch proof extending permutation lemma



Weak Bruhat order

- definition and equivalent formulation
- an example



Thank You!