

**Racah problems for the oscillator algebra and  $\mathfrak{sl}_n$** 

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**Abstract:** We consider the tensor product of  $n$  copies of the oscillator algebra  $\mathfrak{h}$ . Using the Hopf structure and Casimir operator of  $\mathfrak{h}$ , we construct a subalgebra  $\mathcal{R}_n(\mathfrak{h})$  in the same way the higher rank Racah algebra was constructed for  $\mathfrak{su}(1,1)$  in [1]. One can embed the algebra  $\mathcal{R}_n(\mathfrak{h})$  into  $\mathfrak{sl}_{n-1}$  after an affine transformation of the generators by central elements. We study the connection between recoupling coefficients for  $\mathfrak{h}$  and  $\mathfrak{sl}_n$ -representations. These coefficients turn out to be multivariate Krawtchouck polynomials. The relation with the Wigner- $3nj$  symbols for  $\mathfrak{h}$  is explained. Flipping two factors in the tensor product is a symmetry of  $\mathcal{R}_n(\mathfrak{h})$ . This leads to an automorphism of  $\mathfrak{sl}_{n-1}$ . The corresponding group elements of  $SL(n-1)$  are constructed.

This is joint work with Nicolas Crampé and Luc Vinet.

- [1] H. De Bie, V.X. Genest, L. Vinet, W. van de Vijver, A higher rank Racah algebra and the  $(\mathbb{Z}_2)^n$  Laplace-Dunkl operator. *J. Phys. A: Math. Theor.* 51 025203 (20pp), 2018.