

# Positive product formula and integral representations for some classes of special functions associated with root systems

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*The talk is based on the joint work with Margit Rösler*

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It is well known that the spherical functions of symmetric spaces of rank one are either Bessel functions, Jacobi functions, or Jacobi polynomials. Moreover, the product formulas and the Harish-Chandra integral representations for the spherical functions lead by analytic continuation to corresponding formulas for a continuous range of these special functions.

In the talk we review recent extensions of these classical results to the multivariate setting, where the spherical functions of Cartan motion groups and (compact and non-compact) Grassmann manifolds are related to Bessel functions on Weyl chambers and to Heckman-Opdam hypergeometric functions (and polynomials) of type BC. We also consider some reductive cases as well as Laguerre functions associated with Heisenberg groups.

We emphasize that explicit versions of the integral representations lead to interesting limit transitions for these special functions with explicit error estimates. These limits have applications e.g. to central limit theorems for random walks on the associated symmetric spaces and also to the spherical functions of associated Olshanski spherical pairs of finite rank.