Combinatorial and analytic properties of the \( n \)-dimensional Hermite polynomials

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We investigate some combinatorial and analytic properties of the \( n \)-dimensional Hermite polynomials introduced by Hermite in the late 19-th century. We derive combinatorial interpretations and recurrence relations for these polynomials. We also establish a new linear generating function and a Kibble-Slepian formula for the \( n \)-dimensional Hermite polynomials which generalize the Kibble-Slepian formula for the univariate Hermite polynomials and the Poisson kernel (Mehler formula) for the \( n \)-dimensional Hermite polynomials. This talk is based on a joint work with Professor Mourad Ismail.