

Shannon-like integrals of hypergeometric orthogonal polynomials with large parameters and applications to high-dimensional harmonic and hydrogenic systems

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In this talk we determine the asymptotics of various logarithmic-type integral functionals of hypergeometric orthogonal polynomials (Laguerre, Gegenbauer) when their parameter $\alpha \rightarrow \infty$. Then, we apply the corresponding results to find the physical Shannon entropies for all the stationary states of harmonic and hydrogenic systems with a very high dimensionality D . Briefly, it is found that these entropies have the same rate of growth, $\mathcal{O}(D \log D)$, when $D \rightarrow \infty$ for both types of quantum systems.

References

- [1] A. I. Aptekarev, E. D. Belega, I. V. Toranzo, J. S. Dehesa 2019 *The Shannon entropy of high-dimensional hydrogenic and harmonic systems*. Preprint iC1 (submitted).
- [2] B. M. Temme, I. V. Toranzo and J. S. Dehesa 2017 Entropic functionals of Laguerre and Gegenbauer polynomials with large parameters *J. Phys. A: Math. Gen.* **50** 215206.

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