LIMIT THEOREMS FOR JACOBI ENSEMBLES WITH LARGE PARAMETERS

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Consider N interacting particles in the interval $[-1, 1]$. We investigate the freezing regime, i.e. the situation where the inverse temperature κ tends to infinity.

We therefore consider a random variable X_κ with the density

$$c_{\kappa,a,b} \prod_{1 \leq i < j \leq N} (x_j - x_i)^\kappa \prod_{i=1}^{N} (1 - x_i)^{\frac{\kappa(a+b)}{2} - \frac{1}{2}} (1 + x_i)^{\frac{\kappa b}{2} - \frac{1}{2}} \, dx$$

on the alcoves $A := \{x \in \mathbb{R}^N | -1 \leq x_1 \leq ... \leq x_N \leq 1\}$. For $a \geq 0, b > 0$ fixed, we derive a central limit theorem for these distributions when $\kappa \to \infty$. We also rewrite the CLT in trigonometric form and determine the eigenvalues and eigenvectors of the limit covariance matrices.