

Exact solution of the finite Grosse-Wulkenhaar model

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We find the exact solutions of the Φ_2^3 finite matrix model (Grosse-Wulkenhaar model). In the Φ_2^3 finite matrix model, multipoint correlation functions are expressed as $G_{|a_1^1 \dots a_{N_1}^1 | \dots | a_1^B \dots a_{N_B}^B |}$. The $\sum_{i=1}^B N_i$ -point function denoted by $G_{|a_1^1 \dots a_{N_1}^1 | \dots | a_1^B \dots a_{N_B}^B |}$ is given by the sum over all Feynman diagrams (ribbon graphs) on Riemann surfaces with B -boundaries, and each $|a_1^i \dots a_{N_i}^i |$ corresponds to the Feynman diagrams having N_i -external lines from the i -th boundary. It is known that any $G_{|a_1^1 \dots a_{N_1}^1 | \dots | a_1^B \dots a_{N_B}^B |}$ can be expressed using $G_{|a^1 | \dots | a^n |}$ type n -point functions. Thus we focus on rigorous calculations of $G_{|a^1 | \dots | a^n |}$. The formula for $G_{|a^1 | \dots | a^n |}$ is obtained, and it is achieved by using the partition function $\mathcal{Z}[J]$ calculated by the Harish-Chandra-Itzykson-Zuber integral.

Primary author: Mr KANOMATA, Naoyuki (Tokyo University of Science)

Presenter: Mr KANOMATA, Naoyuki (Tokyo University of Science)

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