Seminário de sistemas dinâmicos e estocásticos

Departamento de Matemática - IMECC - UNICAMP

The 1-dimensional Log-gas and its Sine Gordon representation.

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Resumo:

Consider a model gas of electrically charged particles in D a bounded subset of $\mathbb{R}^d$. The interaction given by $\lambda_i\lambda_j V(|x_i - x_j|)$ where $\lambda_i, \lambda_j \in \{-1, 1\}$ stands for the particle charge and $x_i, x_j \in D$ for the particle position and V represents the eletrical potential (which is a function of the distance). Given α and β two positive parameters, our model is described by the following partition function which induces a probability distribution on the set of charged particles

$$\mathcal{Z}^V_{\alpha,\beta}(\mathcal{O}) = \sum_{n=0}^{\infty} \frac{\alpha^n}{n!} \sum_{()_{i=1}^n \in \{-1,1\}^n} \int_{D^n} \exp\Big(-\beta \sum_{1\le i<j\le n} \lambda_i\lambda_i V(|z_i - z_j|)\Big) \prod_{i=1}^n dz_i$$

We are interested specifically in the case when V diverges logarithmically in zero $V(r) = -\log r + O(1)$. In that case, we observe that the above partition function is finite if and only if $\beta \ge d$. The aim of this talk is to introduce renormalization techniques using connection with Gaussian fields which allows for a definition of the Log-gas when $\beta \in [d, 2d)$. (joint work with V.Vargas and R.Rhodes).

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