**Chilean Probability Seminar**

**Orador:** Eric Endo (NYU-Shanghai, China)

**Título:** Contour methods for $d$-dimensional Long-Range Ising Model.

**Resumen:** On the $d$-dimensional lattice $\mathbb{Z}^d$ with $d \geq 2$, the phase transition of the nearest-neighbor ferromagnetic Ising model can be proved by using Peierls argument, that requires a notion of contours, geometric curves on the dual of the lattice to study the spontaneous symmetry breaking.

It is known that the one-dimensional nearest-neighbor ferromagnetic Ising model does not undergo a phase transition at any temperature. On the other hand, if we add a polynomially decaying long-range interaction given by $J_{xy} = |x - y|^{-\alpha}$ for $x, y \in \mathbb{Z}$, the works by Dyson and Fr\"{o}hlich-Spencer show the phase transition at low temperatures for $1 < \alpha \leq 2$. Moreover, Fr\"{o}hlich and Spencer defined a notion of contours for $\alpha = 2$. There are many other works that study and extend the notion of contours for other $\alpha$.
%The work by Cassandro, Ferrari, Merola, and Presutti defined the contours for a region of $\alpha$

In this talk, we define a notion of contours for $d$-dimensional long-range Ising model with $d \geq 2$, where the interactions are given by $J_{xy} = |x - y|^{-\alpha}$ where $\alpha > d$ and $x, y \in \mathbb{Z}^d$. As an application, we add non-homogeneous external fields $h_x = |x|^{-\gamma}$ in the Hamiltonian and give conditions for $\gamma$ and $\alpha$ so that the model undergoes a phase transition at low temperatures.

Joint work with Lucas Affonso, Rodrigo Bissacot, and Satoshi Handa.

El enlace para conectarse al seminario es:

Unirse a la reunión Zoom
https://reuna.zoom.us/j/84521834914?pwd=OTZ6Y0NWM3pYTGtTbEt3c0luTG96UT09

ID de reunión: 845 2183 4914
Código de acceso: 997973
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Modalidad híbrida en la sala Multimedia CMM, Beauchef 851, Torre Norte Piso 6.
**Miércoles 03 de julio 2024   a las 16:15 hrs.**