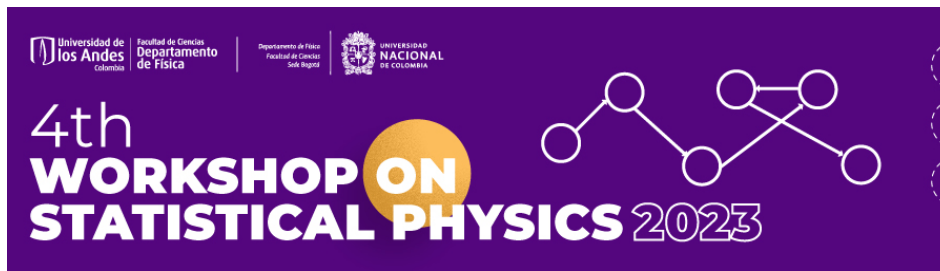


## 4th Workshop on Statistical Physics



Contribution ID: 3

Tipo: **Invited talk**

# Physical properties driven by phase separation in electron-correlated materials: percolation and avalanches.

*viernes, 6 de octubre de 2023 10:30 (20 minutos)*

Strongly electron-correlated materials provide a rich platform for exploring the underpinnings of fundamental physics. These systems are characterized by a complex energy landscape, originating from the interplay of competing phases, which manifests in diverse phenomena including metal-insulator transitions, multiple magnetic transitions, and structural phase transitions. In some instances, these transitions can coincide, leading to intriguing and complex behavior. Viewed from a fundamental perspective, such transitions can be conceptualized as being driven by an external force to a critical point where the transition ceases to be continuous, thereby causing the system to progress via a series of discrete avalanches and therefore showing key fingerprints of percolation effects.

Here I will show recent research that exemplifies the collective behavior observed in particular physical systems [1,2]. These systems predominantly consist of oxide materials, like vanadium oxides and praseodymium-doped manganites, which share a common characteristic: strong electron-electron interactions across multiple scale lengths. Vanadium oxides demonstrate a first-order structural phase transition and a metal-insulator transition, induced by voltage, light, and temperature. In contrast, praseodymium-doped manganites reveal multiple magnetic phase transitions, magnetic percolation, and spin frustration, offering further layers of complexity.

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References:

- [1] Wolowiec, C.T. et al., Physical Review Materials 6, 064408 (2022).
- [2] Carranza-Celis, D. et al., Physical Review Materials 5, 124413 (2021).

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