

PROPUESTA DE TRABAJO DE FIN DE MÁSTER
MÁSTER EN MATEMÁTICAS AVANZADAS
Curso 2025-26

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Curso: Máster Matemáticas Avanzadas

Título: The SPT classification of 1D quantum phases of matter

Resumen y bibliografía:

The classification of quantum phases of matter is a major challenge in mathematical physics. The 1D case has been recently solved, culminating a series of breakthrough results involving several mathematical techniques: tensor networks, operator algebras, group cohomology, ...

The goal of this "Trabajo Fin de Master" is to present this in a unified and pedagogical way, which might require to solve minor, but still interesting, open questions.

References:

- [1] Ogata, Y. (2021). A classification of pure states on quantum spin chains satisfying the split property with on-site finite group symmetries. *Transactions of the American Mathematical Society, Series B*, 8(12), 335–377
- [2] Matsui, T. (2001). The split property and the symmetry breaking of the quantum spin chain. *Communications in Mathematical Physics*, 218(2), 393–416.
- [3] Fannes, M., Nachtergaele, B., & Werner, R. F. (1992). Finitely correlated states on quantum spin chains. *Communications in Mathematical Physics*, 144(3), 443–490.
- [4] Cirac, J. I., Pérez-García, D., Schuch, N., & Verstraete, F. (2021). Matrix product states and projected entangled pair states: Concepts, symmetries, theorems. *Reviews of Modern Physics*, 93(4), 045003.