

Noncommutative Geometry and the Quantum Hall Effect

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Noncommutative geometry is a rather new and fascinating subject, mainly developed by Alain Connes [1]. We will give a basic introduction to the subject, starting with C^* -algebras and Gelfand duality. Noncommutative geometry has deep connections to physics. We will discuss one of them, namely the mathematical proof of the quantization of the quantum Hall effect, found by Bellissard, van Elst and Schulz-Baldes [2].

The quantum Hall effect itself is an extremely important effect from physics, to which two Nobel prizes have been dedicated.

References

- [1] A. Connes, Noncommutative geometry, in Academic Press, Inc., San Diego, CA, 1994, pp. xiv+661.
- [2] J. Bellissard, A. v. Elst, and H. Schulz-Baldes. The noncommutative geometry of the quantum Hall effect, in J. Math. Phys. 35.10 (1994). Topology and physics, pp. 5373–5451.