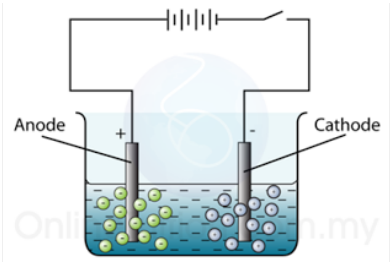
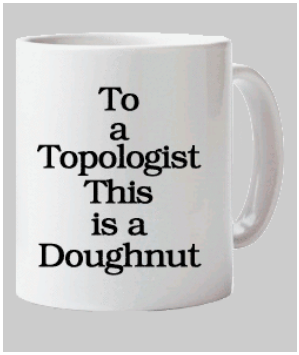
# QUANTUM SEMINARS

## Physics Dept. Theory Section, University of Trieste

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## Quantum transport and topology

**May 18th , 16.30 PM, Seminar Room 204, Miramare**

The Faraday laws of electrolysis state (in modern terms) that the charge transported by a solvated ion between two electrodes is an integer multiple of the elementary charge $e$. But a liquid is an assembly of nuclei and electrons: while the nuclear charges can be considered as point-like, the electronic charge is delocalized all over the cell. The moving ions drag "some" charge, whose integrated value is nonetheless ill defined. Ionic charges in solution can only be computed via some approximate formula, and are *noninteger*. So why is the electrode-to-electrode transported charge quantized? The answer (Thouless, 1983) is in topology: I will give a simplified view of this.

## Are polarization and magnetization really bulk properties?

**May 25th , 16.30 PM, Seminar Room 204, Miramare**

The Thouless theorem, highlighted in the previous talk, can be considered as a precursor of the modern theory of polarization, developed in the early 1990s. The theory of (orbital) magnetization followed since 2005. There are strong similarities between the two material properties, but also key *qualitative* differences, discovered recently (2013).