PHYS-726

# Introduction to Frustrated Magnetism

Mila Frédéric

| Cursus | Sem. | Type |
|---|---|---|
| Physics | | Opt. |

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|---|---|
| Language of teaching | English |
| Credits | 2 |
| Session | |
| Exam | Oral |
| Workload | 60h |
| **Hours** | **28** |
| Lecture | 28 |
| **Number of positions** | **30** |

## Frequency

Every 3 years

## Remark

Next time: Spring 2026

## Summary

To provide an introduction to all aspects of the rapidly evolving field of frustrated magnetism: 1) New paradigms: spin liquids, spin ice, topological order, ... 2) Basic models and methods 3) Experimental realizations

## Content

1) Introduction: definition and overview of frustration in magnetism
2) Basic models
3) Classical frustrated magnets: ground state degeneracy and ground state correlations
4) Order by disorder: ordering by thermal or quantum fluctuations
5) Spontaneous breaking of translational symmetry: valence-bond solids, magnetization plateaux
6) Broken SU(2) symmetry without magnetic order: nematic order
7) Spin liquids: Resonating-Valence Bond liquids, algebraic order, topological order
8) Conclusion: open issues and perpectives

## Keywords

Solid state physics, quantum magnetism, frustration, quantum phase transitions

## Learning Prerequisites

### Required courses

Basic courses of quantum mechanics, statistical physics and solid state physics

## Learning Outcomes

By the end of the course, the student must be able to:

- Carry out research dealing with frustrated magnetism.

## Resources

### Moodle Link

- https://go.epfl.ch/PHYS-726