

PHYS-726

Introduction to Frustrated Magnetism

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Cursus	Sem.	Type
Physics		Opt.

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 perspectives

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>

