

## Radio Frequency Solid State Physics

2 units (selection)

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**Target** This class introduces basis of NMR and applications to studies on superconductivity, magnetism and ionic diffusion in solid.

**Outline** The spectrum, spin-lattice relaxation, spin-spin relaxation, chemical shift etc., which are obtained by NMR measurements, are introduced and discussed in connection with various physical properties of solids.

**Keyword** *nuclear magnetic resonance, magnetism, diffusion*

**Goal**

1. To understand basis of NMR.
2. To understand relationship between various problems in solid state physics and relaxation phenomena observed using NMR.

**Schedule**

1. Introduction to nuclear magnetic resonance (NMR)
2. Zeeman interaction
3. Larmor precession
4. Magnetization
5. Motion of magnetization under magnetic field
6. Bloch equations
7. Dipole interaction
8. Magnetic interactions of nuclei with electrons
9. Internal magnetic field in ferro and antiferro magnets
10. Spin-lattice relaxation and motional narrowing of resonance lines
11. Diffusion in solid and spin-lattice relaxation
12. Relaxation model for diffusion
13. NMR studies on lithium ionic conductors
14. NMR studies on protonic conductors
15. Application of NMR

**Evaluation Criteria** Assignments count 100%.

**Textbook** なし

**Reference** To be introduced in the class

**Contents** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216790>

**Contact**

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