

## General magnetometry

Vittorio Basso  
Torino, Italy  
[\\*v.basso@inrim.it](mailto:v.basso@inrim.it)

We discuss the basics to understand the characterization of the hysteresis properties of ferromagnetic materials. We will address: the magnetization and the magnetic field in bulk materials; the methods to generate and to accurately measure the magnetic field and the methods of magnetic moment measurement.

### Lecture topics:

1. Introduction to magnetic measurements
  - a. Quantities: magnetic induction and flux, magnetization and magnetic moment, magnetic field
  - b. Magnetostatics and demagnetizing effects
  - c. The M versus H hysteresis loop of ferromagnetic materials
2. Measurement of the magnetic field
  - a. Metrological aspects
  - b. Generation of magnetic fields
  - c. Measurement: from high sensitivity to high spatial resolution
3. Measurement of M vs H of magnetic materials
  - a. Characterization of soft and hard magnetic materials
  - b. Measurement of the magnetic moment (VSM, AGFM, etc)
  - c. Magnetic torque measurements

### Recommended reading:

- [1] F. Fiorillo, Measurement and characterization of magnetic materials. Elsevier, Amsterdam (2004).
- [2] Magnetism: Materials and Applications, Volume 2 (E. du Trémolet de Lacheisserie, D. Gignoux and M. Schlenker, eds.), Springer, Boston (2005)
- [3] High Sensitivity Magnetometers (Grosz, Haji-Sheikh, and Mukhopadhyayeds, eds.) Springer (2017).
- [4] S. Tumanski, Handbook of Magnetic Measurement, CRC Press (2011)