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## Permanent magnets

*Friday 1 December 2023 09:30 (1 hour)*

This lecture presents permanent magnets for accelerator applications. Fundamental concepts such as magnetization, remanence, coercitive field and demagnetizing field are introduced. The main materials used in accelerators are neodymium-iron-boron ( $\text{Nd}_2\text{Fe}_{14}\text{B}$ ) and samarium-cobalt ( $\text{Sm}_2\text{Co}_{17}$ ). The manufacturing process of these materials, as well as their main properties, are presented. A few permanent magnet designs are described: Halbach magnets, permanent magnet dominated and iron dominated designs. The field can be tuned by trimming coils or by movable parts. Permanent magnets are widely used for building undulators. They are of interest for building compact, high gradient magnets, as well as for building low or zero power magnets for storage rings or transfer lines.

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