8-5 Permanent Magnets and Magnetic Recording

Reading Assignment: pp. 265-268

Recall that we studied permanent magnets in section 8-3.

Permanent magnetization allows us to “store” data on magnetic media—for example, your computer hard disk!

HO: Magnetic Recording
Magnetic Recording

An interesting application of ferromagnetic material is in non-volatile data storage (e.g., tape or disk). Ferromagnetics can be used as binary memory!

Q: How?

A: Recall that the magnetization vector in ferromagnetic material retains its direction after the magnetizing field $\mathbf{B}_m(\vec{r})$ has been removed. In other words, it “remembers” the direction of the magnetizing field.

We can assign each of two different magnetizing directions, therefore, a binary state:

If ferromagnetic material is embedded in a tape or disk, we can magnetize (e.g., write) small sections of the media, or detect the magnetization (e.g., read) small sections of the media.
This is the basic principle behind the operation of your computer hard disk!

Q: I see how the magnetic "write head" works, but what is going on with that magnetic "read head"?

A: The read head is using Faraday's Law to detect changes in the tape/disk magnetization. Conveniently, Faraday's Law is the subject of our next section!