16.3: Gauss's Law for Magnetism

By analogy with Gauss's law for the electric field, we could write a Gauss's law for the magnetic field as follows:

$$\Phi_B = C q_{\text{magnetic inside}} \tag{16.3.1}$$

where Φ_B is the outward magnetic flux through a closed surface, C is a constant, and $q_{\text{magnetic inside}}$ is the "magnetic charge" inside the closed surface. Extensive searches have been made for magnetic charge, generally called a **magnetic monopole**. However, none has ever been found. Thus, Gauss's law for magnetism can be written

$$\Phi_B = 0 \quad \text{(Gauss's law for magnetism)}. \tag{16.3.2}$$

This of course doesn't preclude non-zero values of the magnetic flux through open surfaces, as illustrated in Figure 16.3.3.

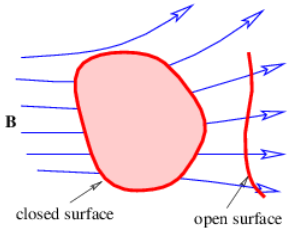

Figure 16.3.3:: Illustration for Gauss's law for magnetism. The net flux out of the closed surface is zero, but the flux through the open surface is not.