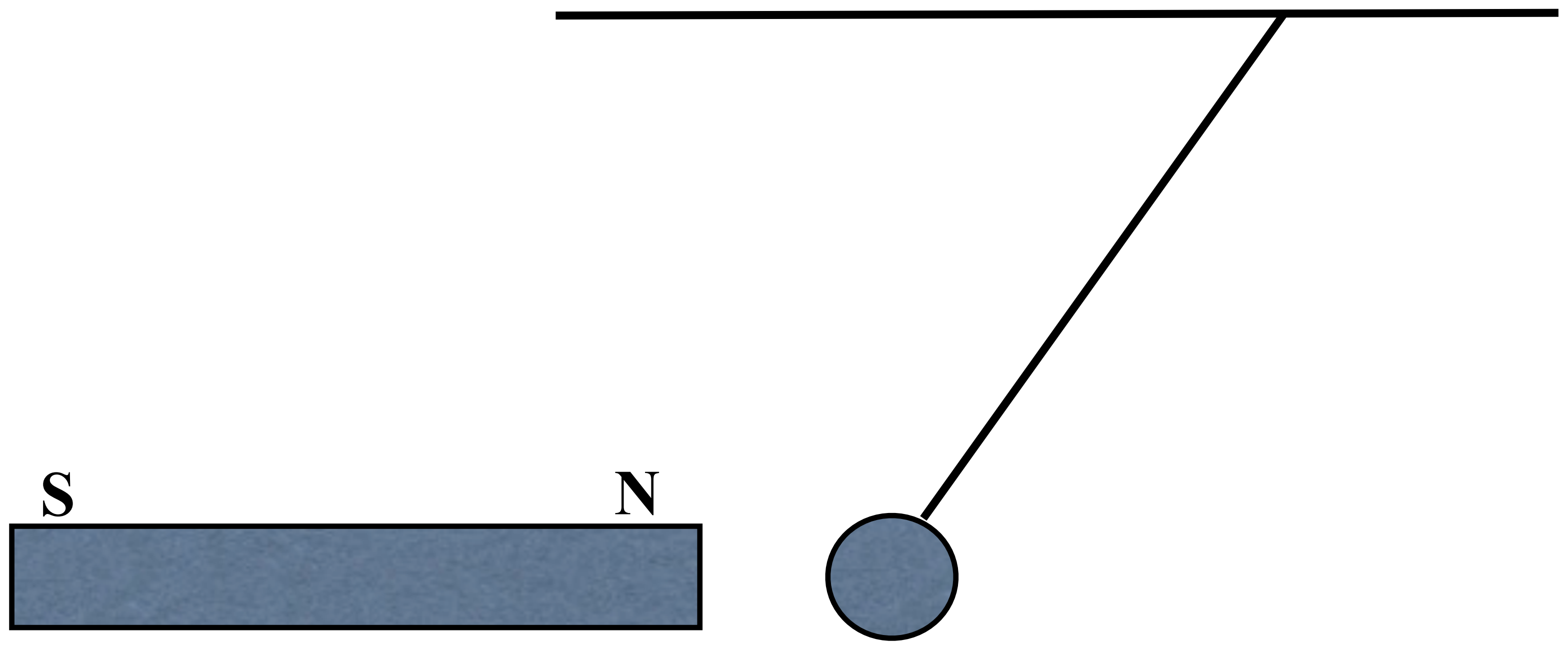
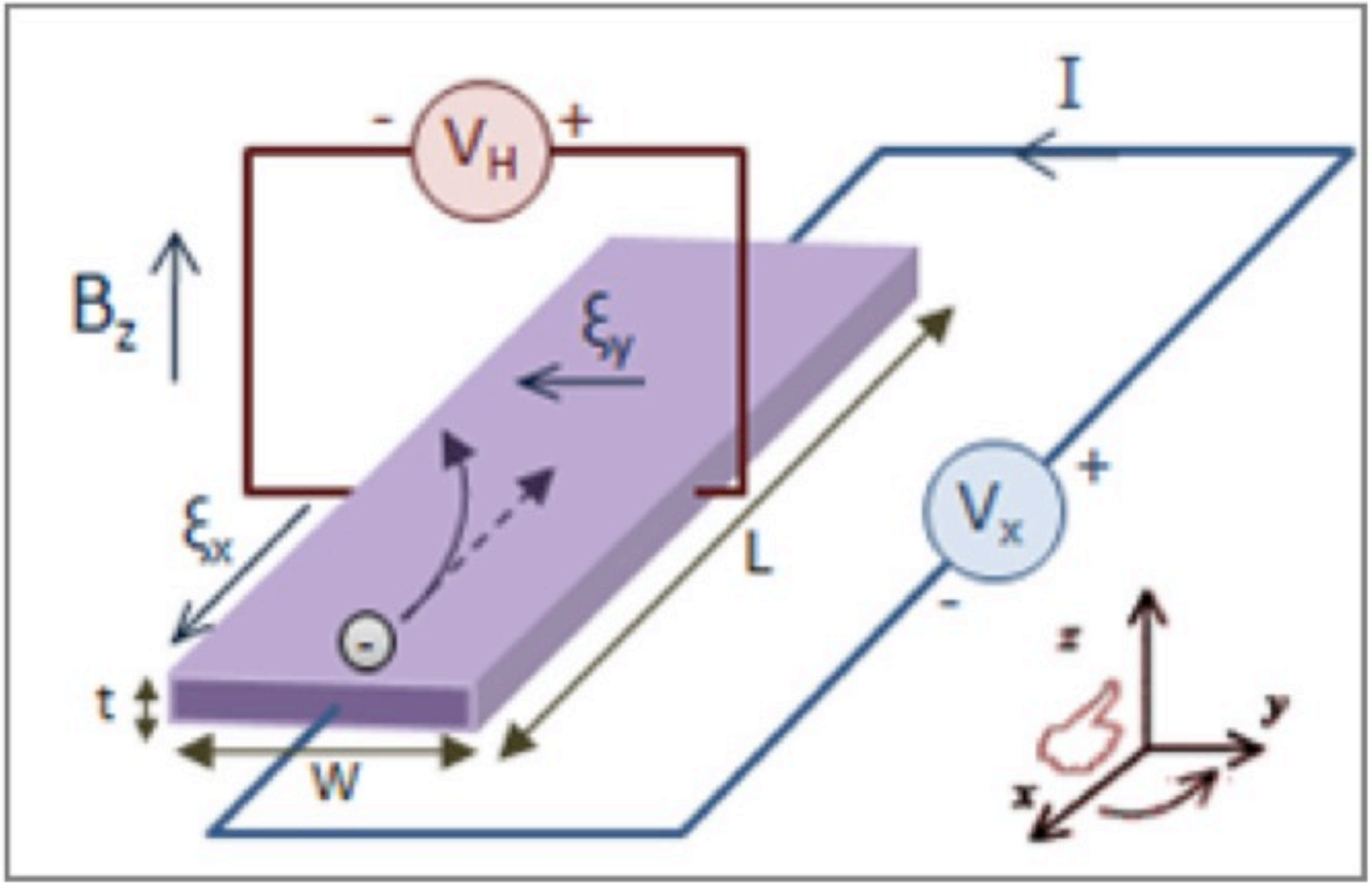


An unmagnetised metal sphere hangs on the thread. When the North pole of a magnet is brought near, the sphere is strongly attracted to the magnet. If the magnet is reversed and the South pole is brought near the sphere, how does the sphere respond?

A) It is strongly attracted to the magnet.
B) It is weakly attracted to the magnet.
C) It is weakly repelled by the magnet.
D) It is strongly repelled by the magnet.



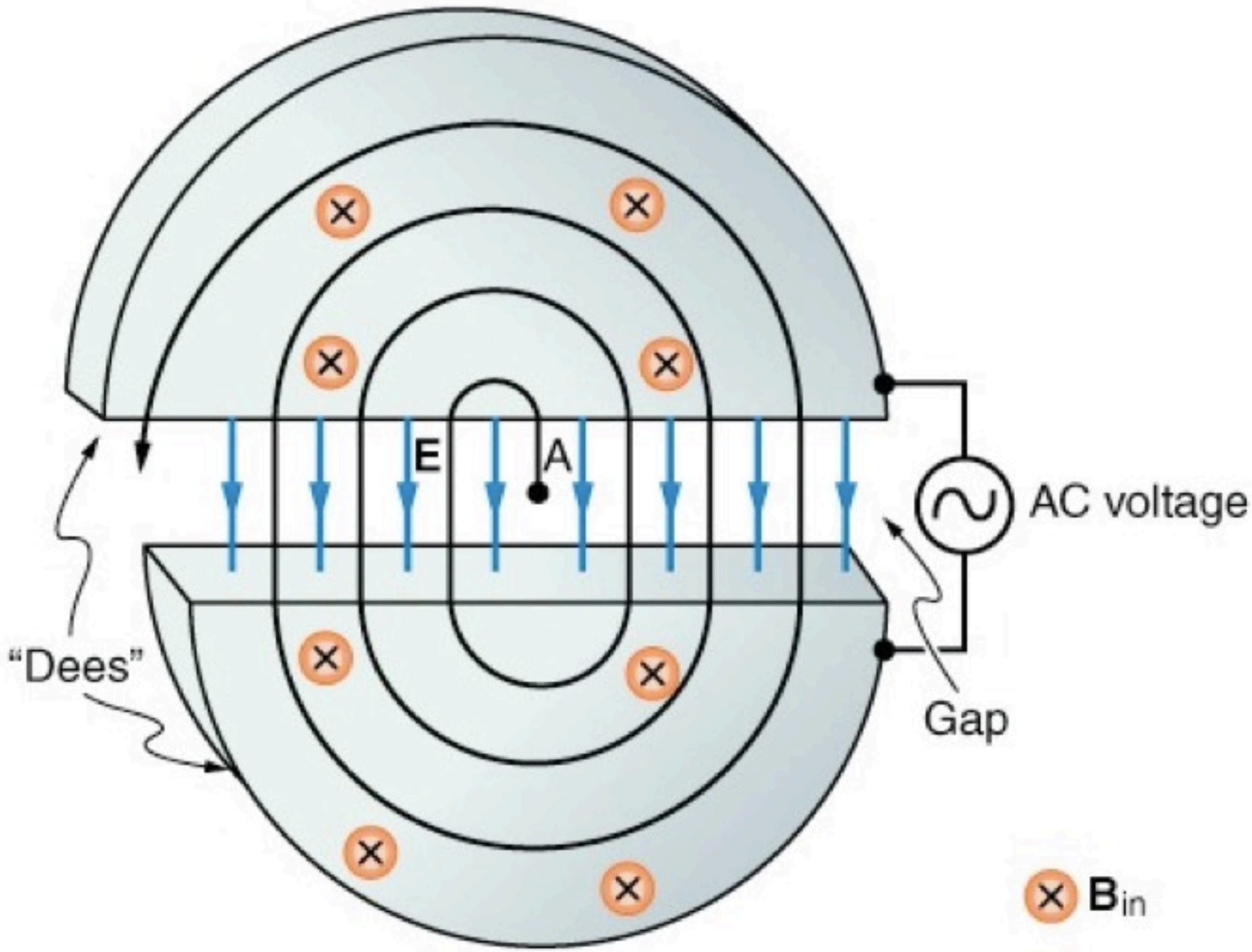
Using the Right Hand Rule and assuming that the charge carriers in a current were positive, they would be deflected toward the left hand edge. Then the left hand edge would be at a higher potential than the right hand edge. If the carriers are negative however, going up rather than down, they would be deflected toward the left hand edge and that edge would be at a Lower potential. Putting a volt meter across the two sides shows that the charge carriers are negative.

$$F = qvB = ma = \frac{mv^2}{r}$$

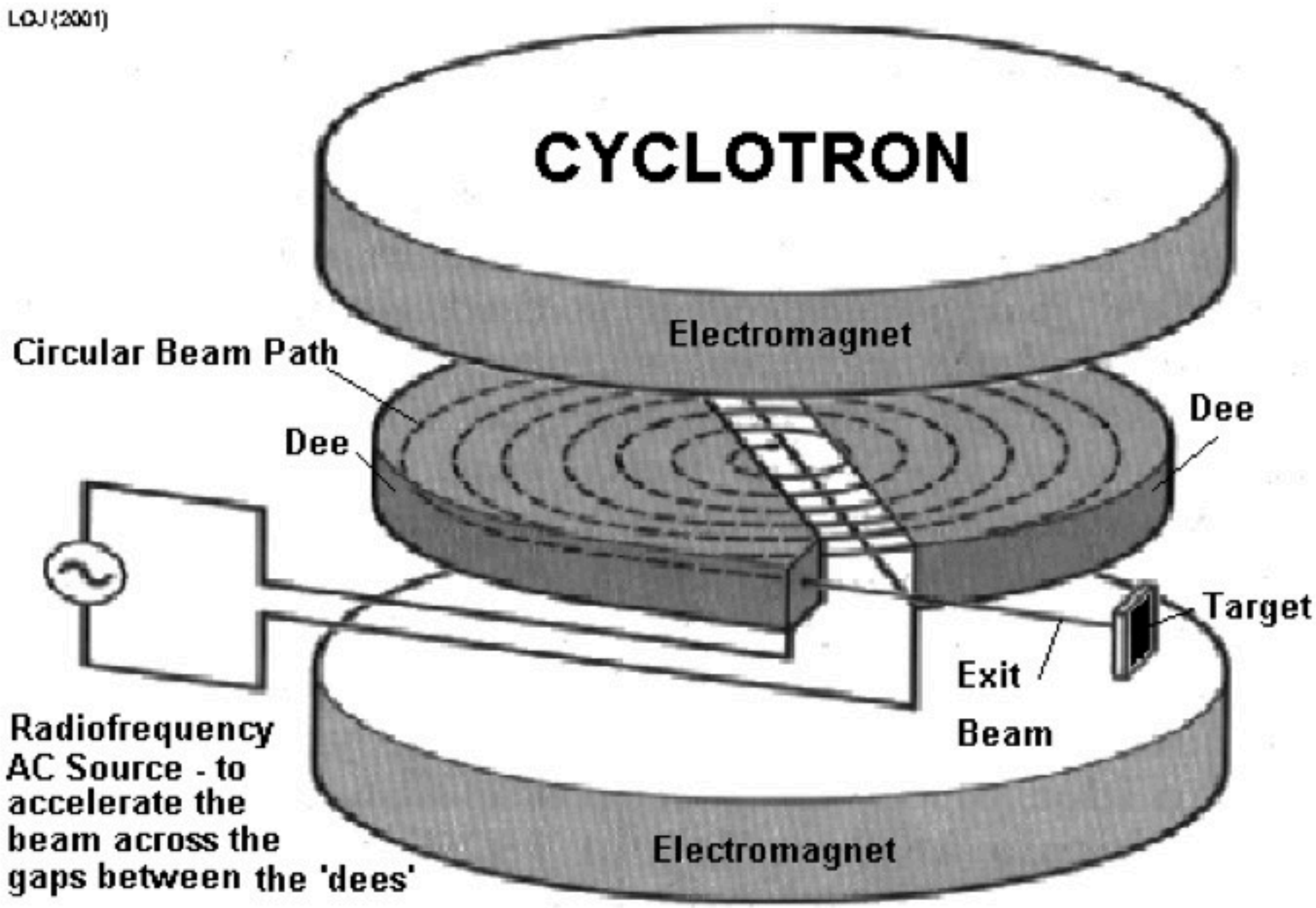
$$\therefore r = \frac{mv}{qB}; T = \frac{2\pi r}{v} = \frac{2\pi}{v} \times \frac{mv}{qB} = \frac{2\pi m}{qB}$$

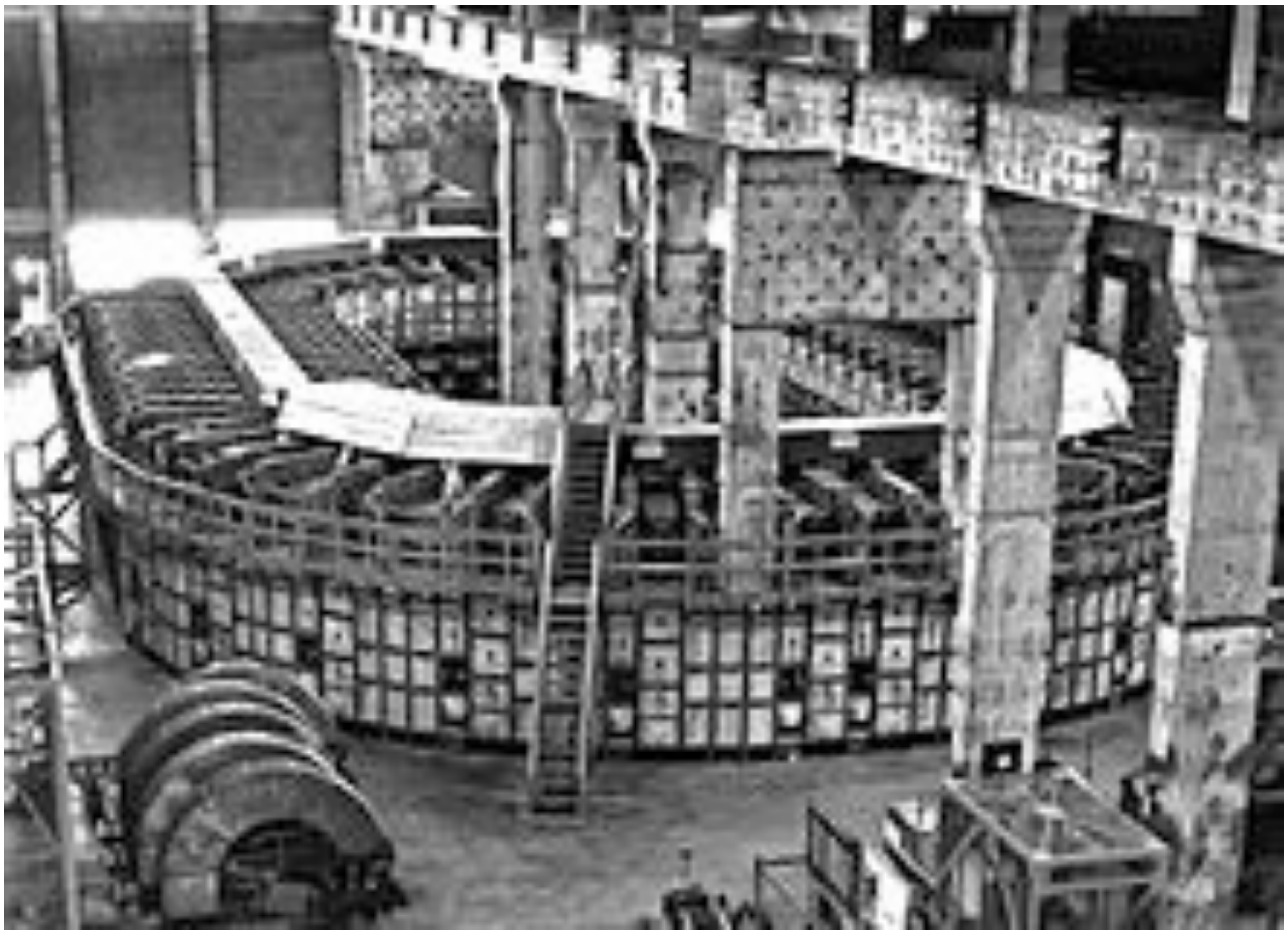
$$f = \frac{1}{T} = \frac{qB}{2\pi m}; \omega = 2\pi f = \frac{qB}{m}$$

Notice that the period of revolution T, the frequency of revolution f, and the angular frequency ω are independent of the radius of the circle. This is a very important fact and has practical applications.



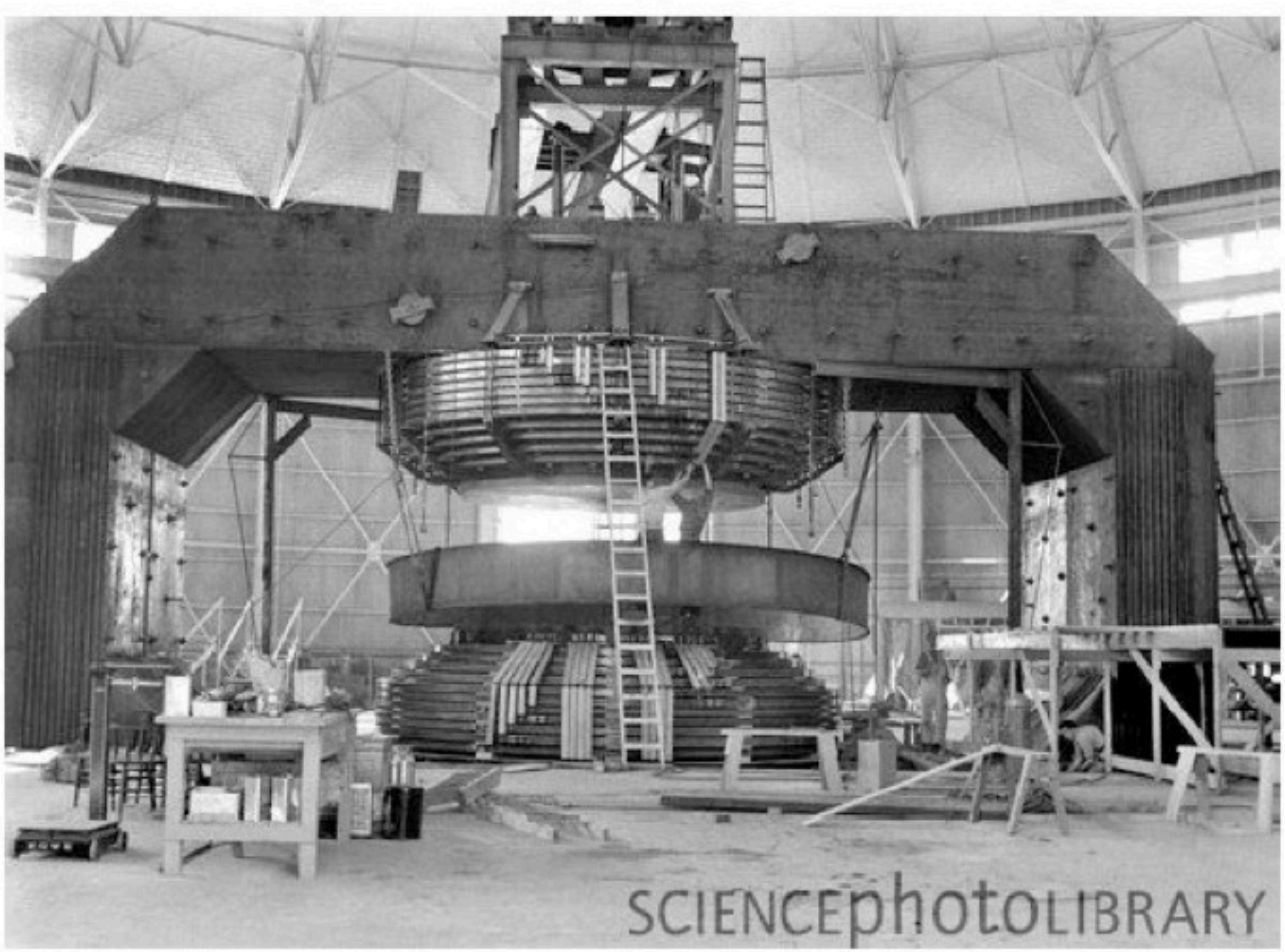
A cyclotron


LOJ (2001)
CYCLOTRON
Electromagnet
Circular Beam Path
Dee
Dee
Target
Exit
Beam
Radiofrequency
AC Source - to
accelerate the
beam across the
gaps between the 'dees'
Electromagnet



Calutron 1944


DO NOT VISIT
with CUBICLE OPERATORS



184 inch cyclotron at University of California under construction

The Cosmotron
Brookhaven National Laboratory

CERN
Geneva, Switzerland