$$\phi_{12} = -\pi R_1^2 B_1$$

and

$$\Delta\phi_{12} = -\underbrace{2\pi R_1 \Delta R_1} B_1$$

Where the sign comes is because outside the small loop

$$\vec{B_1} = -B_1 \hat{z}$$

By reciprocity

$$\Delta\phi_{21} = \Delta\phi_{12}$$

$$\frac{2\pi}{c}\frac{R_2^2}{R_1^2} I \Delta R_1 = 2\pi R_1 \Delta R_1 B_1$$

$$B_1 = \frac{(\pi R_2^2)}{c R_1^3} I = \frac{m_2}{R_1^3}$$

$$m_2 \equiv \frac{I}{c}\pi R_2^2$$

Does it look familiar?