

PHYS 435: Lecture # 21

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Define

$$\vec{B} = \vec{\nabla} \times \vec{A} \quad (1)$$

Then

$$\vec{\nabla} \times B = -\mu_0 \vec{J} \quad (2)$$

When choosing the Coulomb gauge, we obtain:

$$\implies \nabla^2 A = \mu_0 \vec{J} \quad (3)$$

Then

$$A = \frac{\mu_0}{4\pi} \int d^3 r' \frac{\vec{J}(r')}{|r - r'|} \quad (4)$$