Phys 5C

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Date April 5, 2017

- $F = \text{qE} \quad E = k\frac{Q}{r^2}$
- Vector field and Field Lines that represent vector field
- Vector fields have *a* circular field around charges.

1. E due to charge dstrubtions
   - Straightforward: chop up the charge into differential bits dQ

     Find dE from dQ. then integrate (vector integral)
   - Start with uniform charge densities in the shape of: ring->dosl->plane

     Ring of charge, radius a

     If ring has has total charge Q

     Than $\frac{\text{charge}}{\text{length}} = \lambda = \frac{Q}{2\pi a}$
   - the element dL has charge dQ=λdL

     this makes a field dE act at point P

     the only component that doesnt cancel around the ring is dE_y

     $\text{dE}_y = k\frac{\text{dQ}}{r^2}\cos\Theta$

     $\text{E}=\int \text{dE} = (\int \text{dE}_Y)x \Rightarrow k\lambda\frac{x}{(x^2+a^2)^{\frac{3}{2}}}\int \text{dL}$