Answer on Question #40865, Physics, Electromagnetism

If whole charge is concentrated at a point then the volume charge density outside the point is:

Answer

Let whole charge q is concentrated at a point $\overrightarrow{x_0}$. Then the volume charge density outside the point is:

$$\rho(\vec{x}) = q\delta(\vec{x} - \overrightarrow{x_0}) = q\delta(x - x_0)\delta(y - y_0)\delta(z - z_0).$$

The whole notion of a charge concentrated to a point is of course a mathematical fiction.

$\delta(x)$ - delta function, in one dimension, is defined as an object $\delta(x - a)$ such that

$$\int_{-\infty}^{\infty} f(x)\delta(x - a)dx = f(a).$$