

Electric Charge

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Four types of charge distribution

Charge distribution	Dimensionality	Symbol	SI unit
Point charge	0	q, Q	C
Linear charge density	1	λ	C/m
Surface charge density	2	σ	C/m ²
Volume charge density	3	ρ	C/m ³

- ▶ 1 is discrete, 3 are continuous

To get total charge, add discrete charge and integrate continuous charge.

$$Q = \sum_i q_i$$

$$Q = \int dq$$

Integrating over continuous charge gives total charge.

$$Q = \int_P \lambda(\vec{r}) d\ell$$

- ▶ This integral is called a line integral.
- ▶ Path P is a curve over which charge is distributed.