

## P 3.1.4

Effects of force  
in an electric field

P 3.1.4.1 Measuring the force  
of an electric charge  
in a homogeneous electric field



Measuring the force of an electric charge in a homogeneous electric field (P 3.1.4.1)

In a homogeneous electric field, the force  $F$  acting on an elongated charged body is proportional to the total charge  $Q$  and the electric field strength  $E$ . Thus, the formula

$$F = Q \cdot E$$

applies. In this experiment, the greatest possible charge  $Q$  is transferred to an electrostatic spoon from a plastic rod. The electrostatic spoon is within the electric field of a plate capacitor and is aligned parallel to the plates. To verify the proportional relationship between the force and the field strength, the force  $F$  acting on the electrostatic spoon is measured at a known plate distance  $d$  as a function of the capacitor voltage  $U$ . The electric field  $E$  is determined using the equation

$$E = \frac{U}{d}$$

The measuring instrument in this experiment is a current balance, a differential balance with light-pointer read-out, in which the force to be measured is compensated by the spring force of a precision dynamometer.

Cat. No.	Description	P 3.1.4.1
516 32	Current balance with conductors	1
314 081	Precision dynamometer, 0.01 N	1
314 263	Set of bodies for electric charge	1
541 04	Plastic rod	1
541 21	Leather	1
544 22	Parallel plate capacitor	1
300 75	Laboratory stand I	1
521 70	High voltage power supply 10 kV	1
501 05	High voltage cable, 1 m	2
471 830	He-Ne laser 0.2/1 mW max., linearly polarized	1
441 53	Translucent screen	1
300 01	Stand base, V-shape, 28 cm	1
300 02	Stand base, V-shape, 20 cm	1
300 11	Saddle base	1
300 42	Stand rod, 47 cm	2
301 01	Leybold multiclamp	1
500 414	Connection lead, 25 cm, black	1