

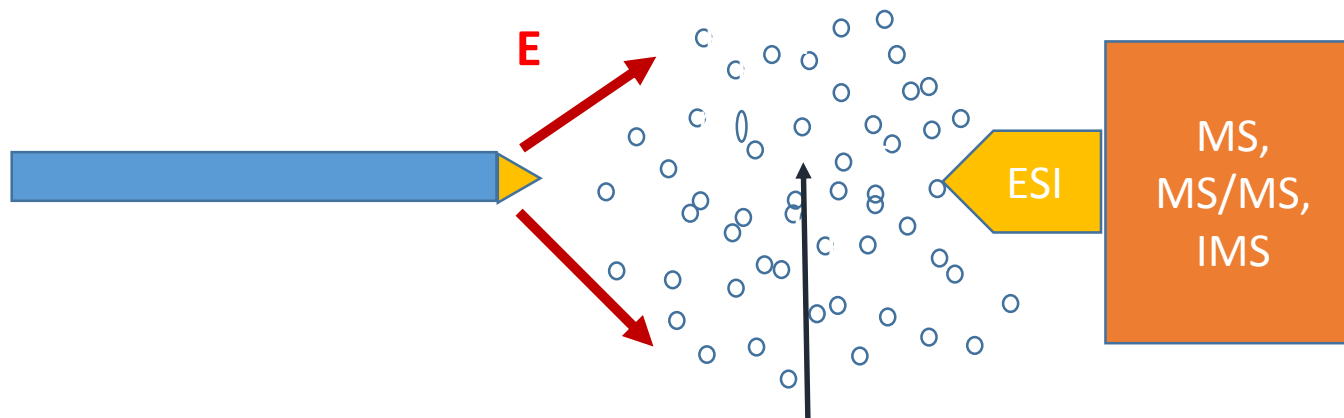
Physics Proves That Spraying is NOT Electrostatically Bright!

There can be five forces on a charged drop in the atmosphere. Droplet trajectories can be calculated using Newton's second law.

$$F = ma = F_g + F_b + F_d + F_e + F_c = \text{Forces SUM} = \text{Gravity} + \text{Buoyant} + \text{Drag} + \text{Electrostatic} + \text{Coulombic}$$

$$F_{\text{coul}} = F_{i,j} = (1/4\pi\epsilon_0)(q_i q_j/r^2)$$

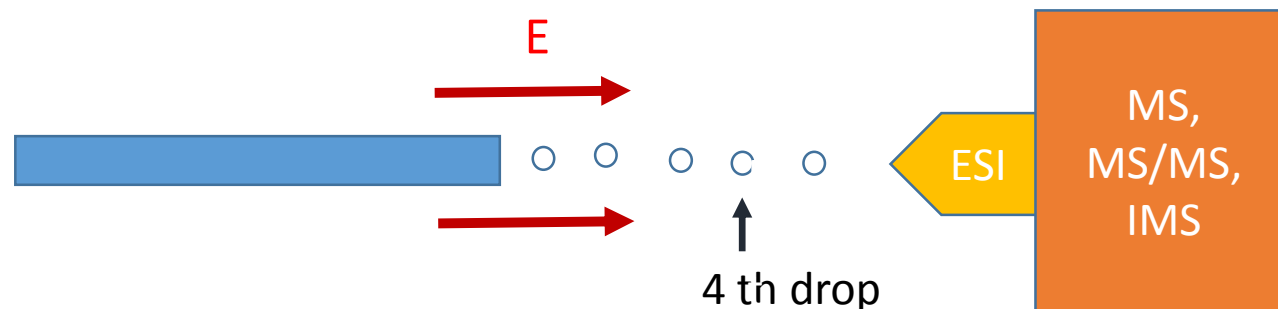
ESI < 1% into source



Note for ESI the coulombic force of the indicated droplets, (i, j) has many coulombic force terms that results in droplets repelling each other which is defocusing. Also, the cone jet naturally sets up a dispersive electric field which results in very low sample introduction efficiency.

F_{coul} on an ESI drop = $F_{\text{c}} \text{ drop1} + F_{\text{c}} \text{ drop2} + F_{\text{c}} \text{ drop 3} + F_{\text{c}} \text{ drop 4} + F_{\text{c}} \text{ drop 5} \dots + F_{\text{c}} \text{ drop N}$, = $F_{\text{c}} \text{ total}$ = Droplets repel each other, which is defocusing !
Also, the field lines (arrows) resulting from the conical cone jet are dispersive i.e., defocusing as well!

IBF = 100% into source!



$$F_{\text{coul}} = F_{i,j} = (1/4\pi\epsilon_0)(q_i q_j/r^2)$$

Note the coulombic force in IBF on the 4th droplet involves only the droplet before it and the droplet after it. The 4th droplet is shielded from the other droplets . Plus in IBF, we direct the droplet to the target using an electric field E, like we're printing!

Coulombic force on 4th droplet includes only the drop before and after. Plus the drops are **directed** into the ESI/MS.

$$F_{\text{coul}} \text{ IBF } 4^{\text{th}} \text{ drop} = F_{\text{c}} \text{ drop before} + F_{\text{c}} \text{ drop after} = F_{\text{c}} \text{ total.}$$