

Source: [KBhPHYS201ElectricFields](#)

1 | Conductors at Equilibrium

If the charges on a conductor are **stationary**, no electron flow within the conductor (so, it's **at equilibrium**)... This means that:

- 1) Net E-field *in* the conducting material must be zero
 - Because, uhh...., the conductor is stationary, meaning no electron flow
 - So, without electric flow, you know that there is no electrons flowing, which means no electric field
- 2) Any electrons that would exist would cluster at the surface of the conductor
 - At equilibrium, the electrons would want to be as far away from each other as possible, meaning that they would stick to the surface — to take advantage of the biggest perimeter/circumference
- 3) At the surface of the conductor, if any E-field is present, it must be perpendicular to the surface
 - If you have a horizontal component, the conductor would be, well, *conducting* electricity, making it rather not static. This horizontal component will push electrons in the conductor around until it doesn't exist
 - If the E-Field is perpendicular, because we are in the Physics Vacuum, no charges will flow because it can't flow out of the conductor into something else

The net electric field inside a neutral conductor must be 0 equilibrium (at which point it is stationary)

- A conductor at equilibrium would see electrons cluster at curves to maintain perpendicularity of e-Fields
 - Because there are more electrons towards the center and across the conductor to push all electrons towards the extremities before achieving equilibrium
 - If charges are evenly distributed instead of being concentrated on sharper corners, the now-unbalanced electrons will create horizontal components

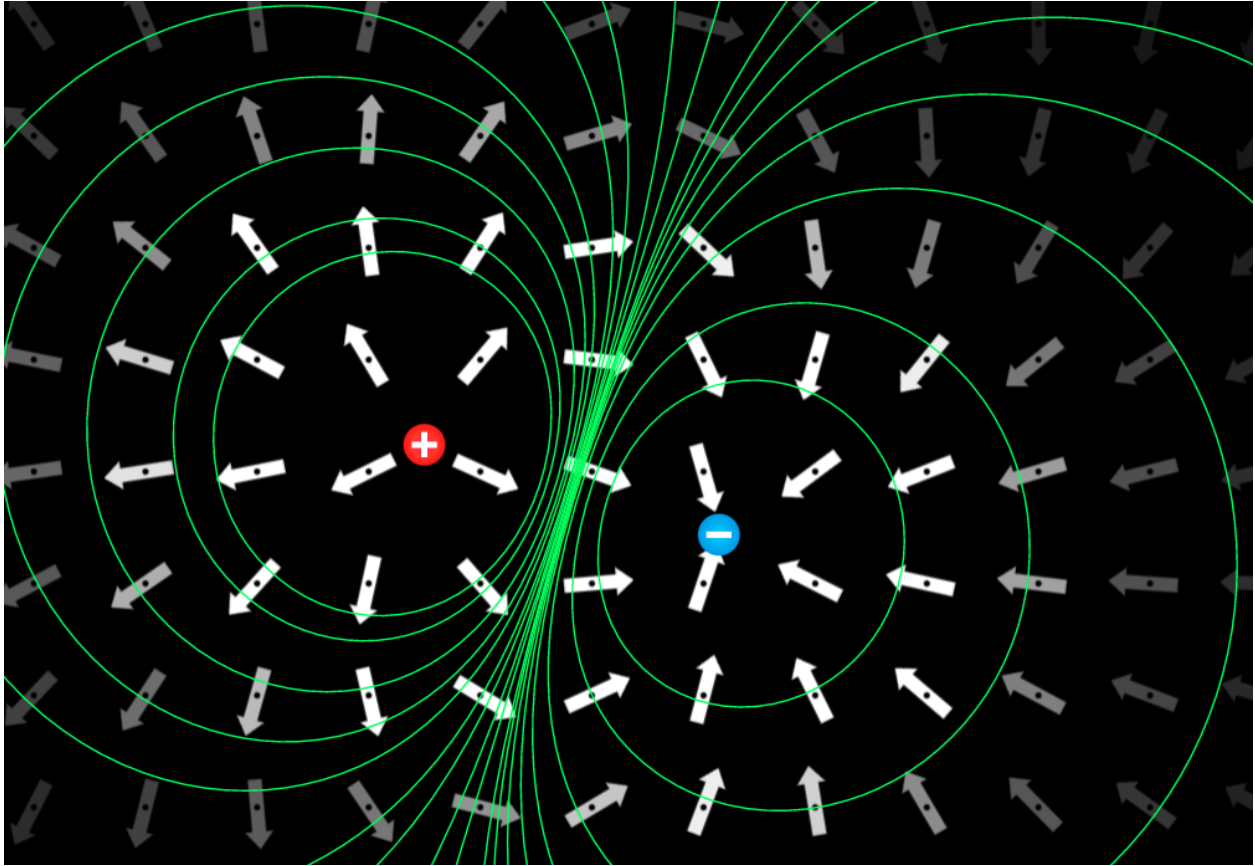


Figure 1: 20phys201srcPhETChargesAndFieldsConstantVoltage.png

- PhET Exploration:

- r0N: [\[KBe20phys201retFieldsVoltagePhET\]](#)
- 'Moka: [\[KBhPHYS201PHETElectricFields\]](#)