**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 horizonal 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 equilibirium 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 equilibirium
   - If charges are evenly distributed instead of being concentrated on sharper corners, the now-unbalanced electrons will create horizonal components
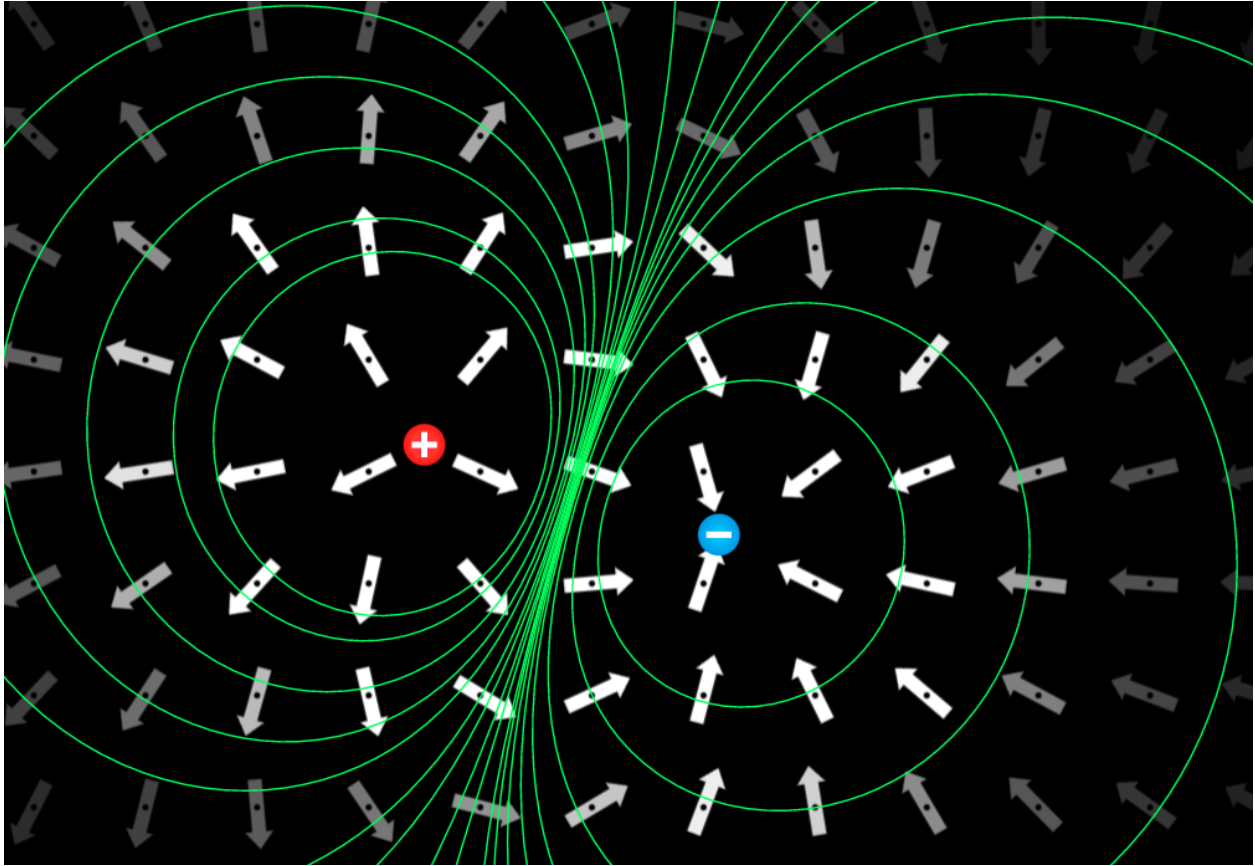
Figure 1: 20phys201srcPhETChargesAndFieldsConstantVoltage.png

- PhET Exploration:

    - r0N: ⟨KBe20phys201retFieldsVoltagePhET⟩
    - 'Moka: ⟨KBhPHYS201PHETElectricFields⟩