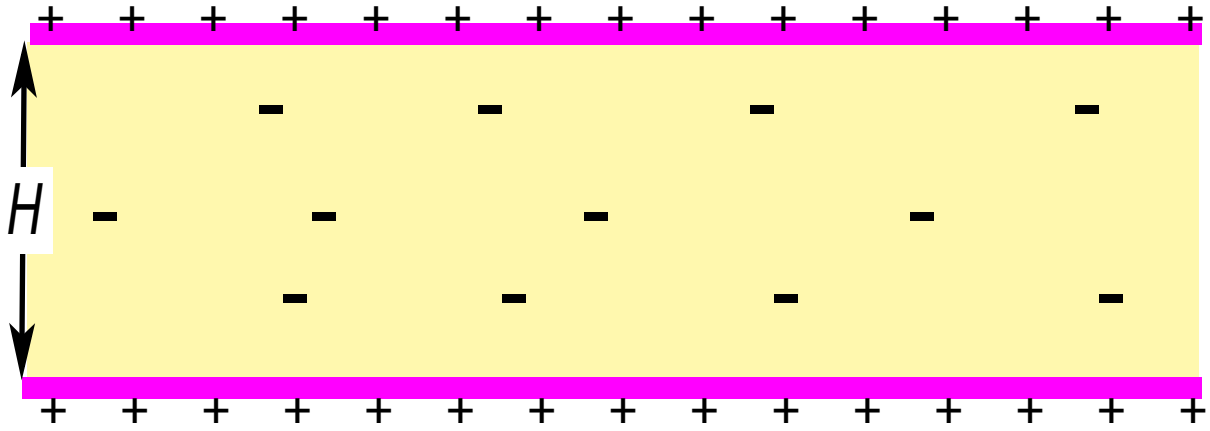


Charged Fluids

- Interaction between charged plates, with neutralizing counterions



- Debye-Hückel screened Coulomb interaction:

$$\delta F_{DH}(H) = \frac{A\sigma^2}{\epsilon} H \times e^{-H/\lambda} \quad \lambda = \sqrt{\frac{\epsilon H k_B T}{2\sigma e}}$$

- Poisson-Boltzmann (charge condensation) interaction:

$$\delta F_{PB}(H) = k_B T \times \frac{A}{\ell_B H} \times \frac{\pi}{2} \quad \ell_B = \frac{e^2}{\epsilon k_B T}$$

- Corrections due to reduced charge fluctuations near surfaces:

$$\delta F_{FI}(H) = -k_B T \times \frac{A}{H^2} \times \left[\frac{\zeta(3)}{16\pi} + \quad \text{(Gouy-Chapman)} \right. \\ \left. \frac{\pi}{4} \left(\frac{\pi}{4} + \frac{1}{2} \right) + \frac{\pi}{4} \ln(2\ell_B \sigma H) + \dots \right]$$