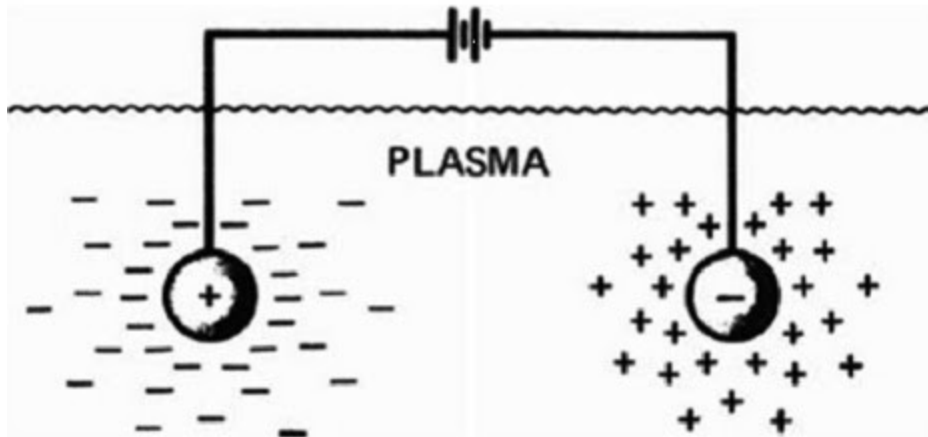


# The Spacecraft Potential as a Density Proxy

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*Fig: A simplified picture of Debye shielding occurring in a plasma.*

## **Project statement:**

The solar wind is turbulent on different temporal and spatial scales. To sample solar wind density fluctuations at the smallest scales, we need very high time resolved solar wind density measurements. This is usually not possible from dedicated plasma experiments and we have to look at alternative methods. One such approach is to use the spacecraft potential as a proxy for the solar wind electron density. This approach is studied as part of this project and then applied to recent spacecraft data.

In this project the student will:

1. Study the physics of Debye shielding and how it is related to spacecraft charging.
2. Study the physics of density fluctuations (turbulence) in the solar wind.
3. Use the spacecraft potential from SoHO, PSP and/or MMS spacecraft to derive the associated solar wind density under different solar wind conditions.

## **Student development and recommended skills:**

During this project, the student will become familiar with the theory of solar wind turbulence and various plasma processes such as Debye shielding. Programming experience is highly recommended with an aptitude for both theoretical work and data analysis. Spacecraft data to be provided via international co-workers.