

## Exercises for Space Plasma Physics:

### IX. Magnetic Reconnection

1. What is magnetic reconnection?
2. Where in the solar system is magnetic reconnection important?
3. Can reconnection happen in laboratory plasmas?
4. Why does the current density  $\mathbf{j}$  and the electric field  $\mathbf{E}$  have the same sign in magnetic reconnection? Hint: study the 2D-case and apply Ohm's law at the X-point.
5. How is magnetic energy converted to other energy forms (which one) during magnetic reconnection?
6. Any idea why scientist use a reduced mass ration  $m_i/m_e$  of 25, 256 etc. for Vlasov-code or full particle simulations instead of the correct value 1836 for a proton electron plasma ?
7. Which MHD-assumptions break down in the diffusion zone?