Space and Astrophysical Plasmas: Final Project Ideas

A short abstract (~100 words) on your final project must be sent to me by e-mail (jasper-halekas@uiowa.edu) for review by **10pm CDT on Thursday 10/12**.

Below is a completely non-exhaustive and non-exclusive list of potential ideas for a final project topic, in no particular order. Some of these are huge fields, so in some cases you would probably want to focus on a particular subtopic. In principle, any topic in the field of space physics and astrophysics is in bounds, as long as it is plasma physics, and as long as there is enough content to produce a good paper that meets the constraints described in the syllabus. *Keep in mind that this project is 1/3 of your grade, so put a commensurate amount of thought and effort into this!*

1. Interaction of a conducting obstacle with flowing plasma
2. The Io plasma torus
3. Alfvén wings
4. Magnetorotational instability in accretion disks
5. Active plasma releases (see AMPTE, CRRES)
6. Cometary interaction with solar wind
7. Interchange instability at giant planets
8. Mass-loading and momentum transfer
9. Acceleration of charged particles at collisionless shocks
10. Dust-plasma interactions (in space)
11. ENA ribbon (discovered by IBEX)
12. MHD turbulence in the solar wind
13. Gradient-drift instability in the ionosphere
14. Auroral electric fields
15. Proton aurora
16. Quasi-parallel vs. quasi-perpendicular collisionless shocks
17. Kelvin-Helmholtz instability
18. Coronal mass ejections
19. Field-line resonances
20. Auroral kilometric radiation
21. Magnetic substorms
22. Sunspot formation/evolution
23. Solar wind heating
24. Whistler-mode chorus
25. Pulsars/pulsar magnetospheres
26. Nebular magnetic fields
27. Ion outflow/polar wind
28. The plasmasphere
29. The plasmasheet
30. The outer heliosphere, heliopause, and termination shock
31. Magnetic field and angular momentum (e.g. magnetic braking in star formation)
32. Jets from accretion disks
33. Stellar dynamos