List of Topics

Week 1 (Mar. 1): Overview of Plasma astrophysics (X. Bai)

Week 2 (Mar. 8): Hydrodynamic and magnetohydrodynamic turbulence
Contact: X. Bai; S. Mao

Topic 1: Hydrodynamic turbulence
Topic 2: Incompressible MHD turbulence: Goldreich-Sridhar theory
Topic 3: Compressible MHD turbulence: simulations
Topic 4*: Kinetic-scale physics

Week 3 (Mar. 15): Magnetorotational instability
Contact: X. Bai

Topic 1: MRI: linear theory and early simulations
Topic 2: MRI: more recent simulations
Topic 3*: MRI: collisionless regime

Week 4 (Mar. 22): Winds and jets
Contact: X. Bai; H. Feng

Topic 1: Magnetized disk winds
Topic 2: Propagation of astrophysical jets

Week 5 (Mar. 29): Laboratory experiments of the MRI and jets
Contact: W. Cui; H. Feng

Topic 1: Laboratory experiments of the MRI
Topic 2: Laboratory experiments of astrophysical jets

Week 6 (no meeting)

Week 7 (Apr. 12): Instabilities in dilute plasmas
Contact: X. Bai; C. Li

Topic 1: Instabilities driven by pressure anisotropy
Topic 2: Magneto-thermal instability
Topic 3: Heat-flux-driven buoyancy instability

Week 8 (Apr. 19): Fermi acceleration
Contact: X. Bai; X. Wang

Topic 1: Fermi acceleration of particles (general theory)
Topic 2: Ion acceleration in non-relativistic shocks
Topic 3*: Electron acceleration in non-relativistic shocks
Topic 4: Particle acceleration in relativistic shocks

Week 9 (Apr. 26): Magnetic reconnection
Contact: X. Bai

Topic 1: Classical models
Topic 2: Plasmoid instability
Topic 3: Recent kinetic simulations
Topic 4: Turbulent reconnection

Week 10 (May 5 note special date): Shock and reconnection experiments
Contact: H. Feng; W. Cui

Topic 1: Laboratory experiments on shocks
Topic 2: Laboratory experiments on reconnection

Week 11 (May 10): Cosmic-ray transport
Contact: X. Bai; W. Cui

Topic 1: Cosmic-ray propagation and transport
Topic 2: Cosmic-ray streaming instability
Topic 3: Cosmic-ray-driven galactic wind

Week 12 (May 17): Cosmic battery and dynamo theory
Contact: Y. Mao; X. Bai

Topic 1: Origin of cosmic magnetism
Topic 2: Overview of (large-scale) dynamo theory

Week 13 (May 24): Solar and planetary dynamos
Contact: Y.-Q. Lou

Topic 1: Solar dynamo
Topic 2: Geo-dynamo

Week 14 (May 31): Origin of galactic and intergalactic magnetic fields
Contact: D. Xu

Topic 1: Origin of intergalactic magnetic field (can be split into 2)
Topic 2: Galactic dynamo (can be split into 2)

Week 15 (Jun. 10 note special date): Solar physics
Contact: Y.-Q. Lou

Topic 1: Solar flares and coronal mass ejection
Topic 2: Classical solar wind models
Topic 3: Solar coronal/wind heating

Week 16 (Jun. 14): Space physics
Contact: S. Mao; J. Zhou

Topic 1: Earth's magnetosphere and space weather
Topic 2: The heliosphere
Topic 3: Solar modulation of cosmic-rays