

Plasma Physics

Lecturers: Pascal André , Nicole Bastid, Nathalie Huret, Régis Lefèvre

Organization: 5 lectures

Aimed public: PhD student in physics

Summary:

The goal of this series of lectures is to give an overview of the Plasma Physics by addressing both the basic theoretical concepts and the experimental methods. The first part will be devoted to electromagnetic plasma with emphasis on electric arc. The second part will be focused on transitory lightning phenomena: sprites, elves and blue jets concerning the observations and the theoretical approaches while the third part will be focused on quark-gluon plasma created in particle accelerators like the Large Hadron Collider (LHC) at the CERN Laboratory.

Part I – Electromagnetic Plasma

1. Basics of thermal plasmas
2. Experiments with Electric arc.

Part II - lightning phenomena

1. Sprites, elves and blue jets
2. Observations: Satellites, ...
3. Theoretical fundamentals

Part III – Quark-Gluon Plasma

1. Basics of particle physics
2. Confinement of quarks and asymptotic freedom
3. Phase diagram of strong interaction
4. Experimental method: heavy ion collisions

Title of the lecturers:

“Basics of particle physics” by **Régis Lefèvre**

“Experiment method: heavy ion collisions” and *“Phase diagram of strong interaction”* by **Nicole Bastid**

“Transitory lightning phenomena” by **Nathalie Huret**

“Basics of thermal plasmas and experiments with electric arcs” by **Pascal André**