# Seminar/Proseminar Plasma Physics summer semester 2021

Dr. Philipp Lauber, Dr. G. Birkenmeier

http://www2.ipp.mpg.de/~pwl/tum/2021_WS.html

- block seminar: 24.-25.6.2021, Zoom

- please choose a topic from the list below according to your level: pro-seminar/first contact students have priority on introductory topics

- contact me (philipp.lauber@ipp.mpg.de) via email with your preferred topic and one alternative (first come first serve basis);

- you are encouraged to choose you own topic (e.g. bachelors, masters, interns) related to your thesis/work

# aim:

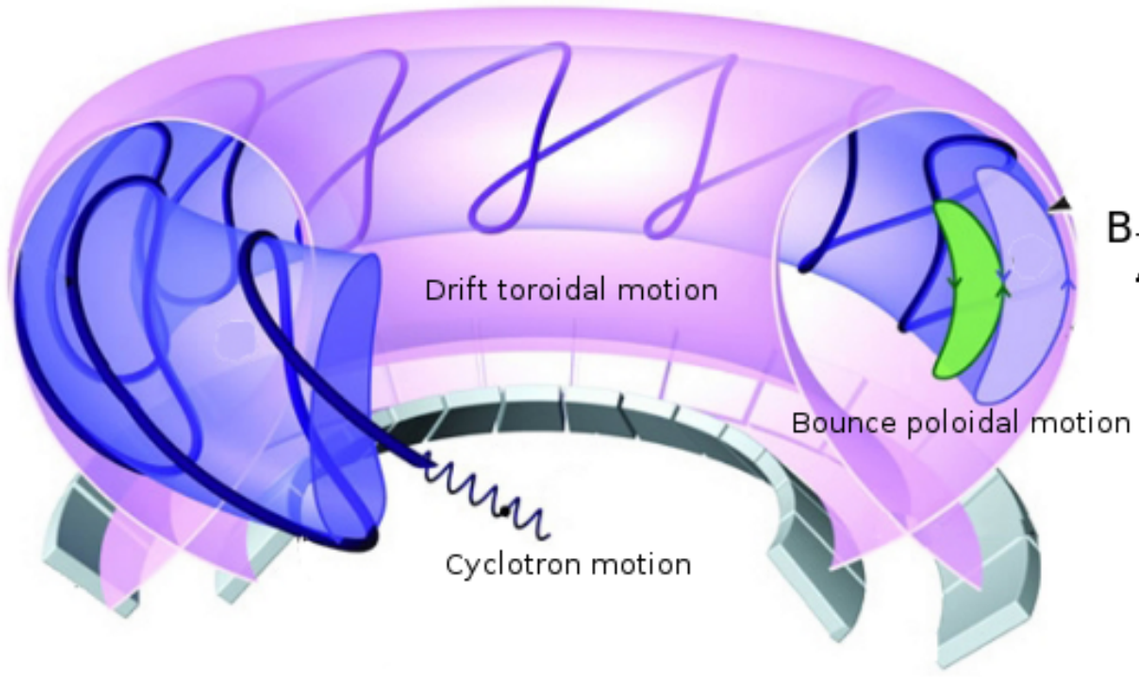
- introductory/deeper knowledge about some aspects of plasma physics
- train presentation skills:

    - preparation of scientific material (reading/understanding)
    - combine  and present material in your own style/words/slides
    - explain and ‘teach’ your material in class, answer questions

# style:

- duration 20+10 mins, language English , Zoom
- discussion: all attendants should try to ask questions
- prepare slides ~~(and/or blackboard)~~
- slides to be discussed and iterated with Gregor/Philipp before the presentation (~1 week before)

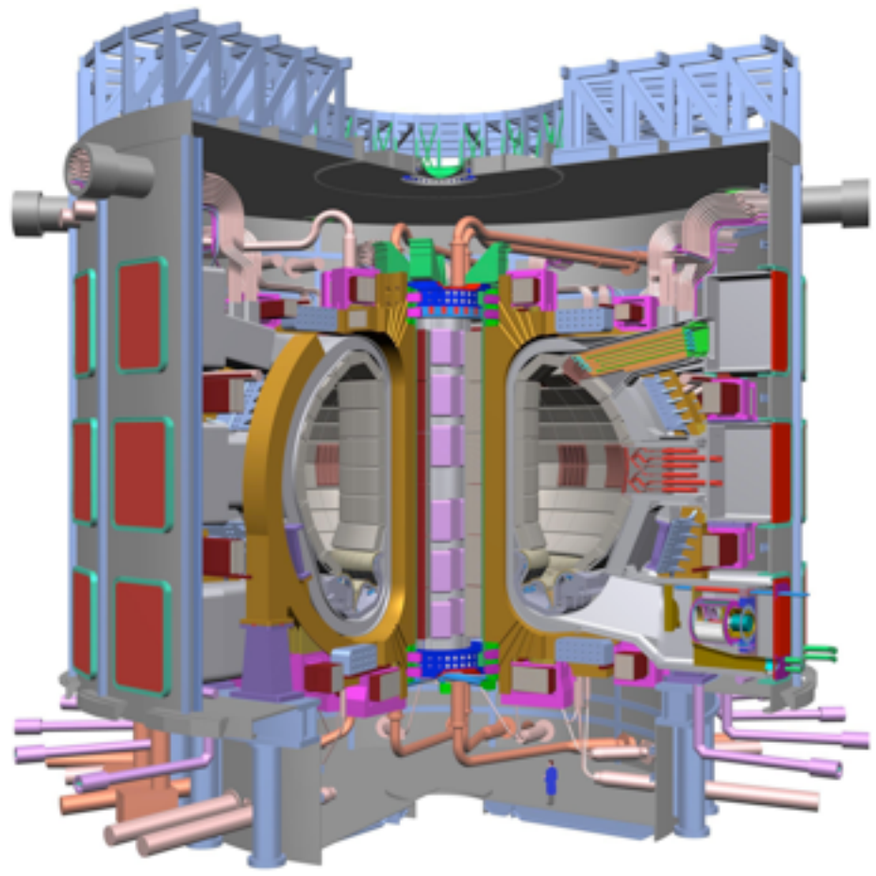
# Charged particle motion in inhomogeneous magnetic fields




drifts, guiding centre description, applications:
magnetic fusion devices, ionosphere,…
(numerical approaches: implicit, explicit, symplectic)

# Tokamaks (JET/AUG/JT60SA/ITER/DEMO)

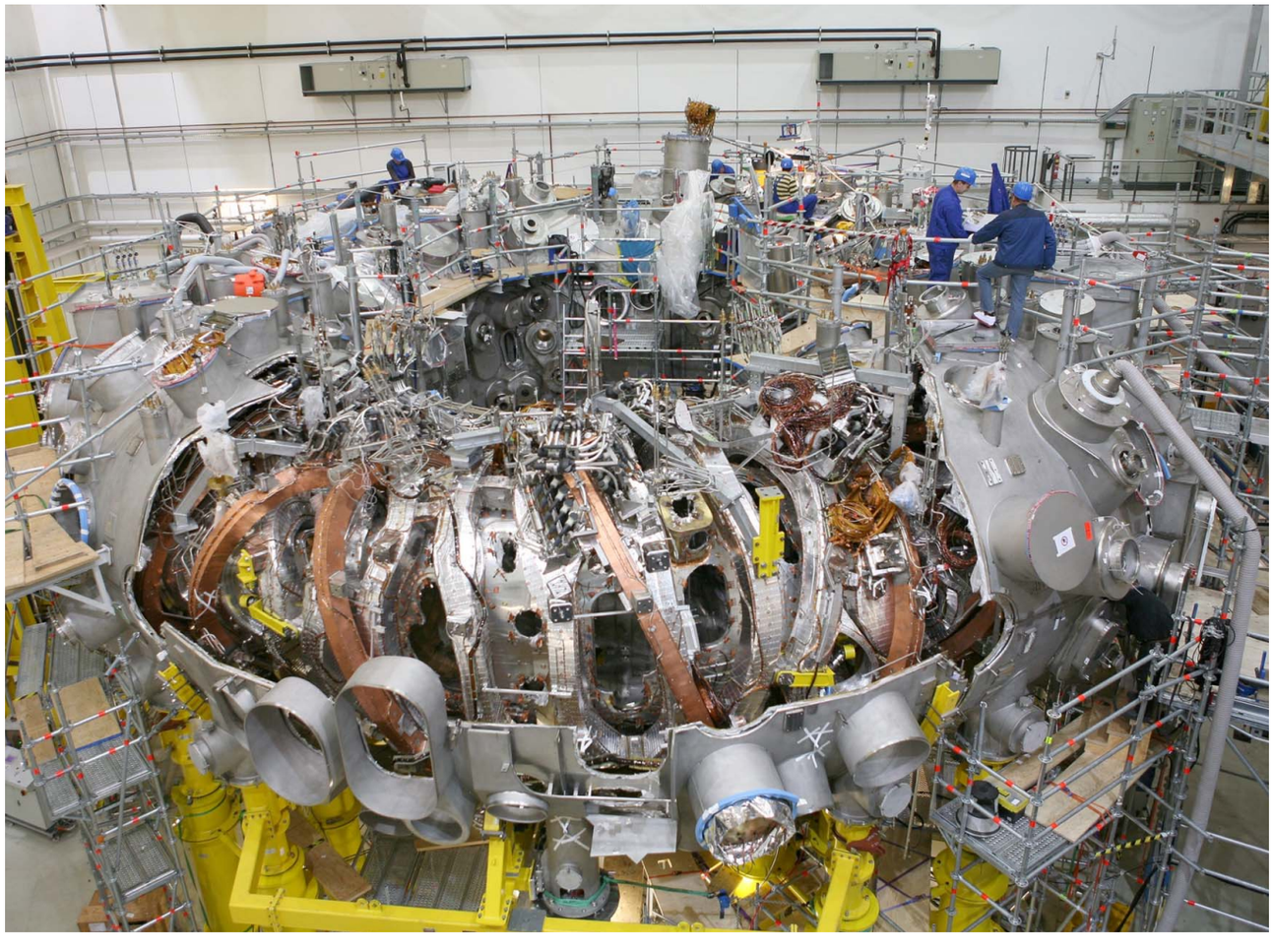




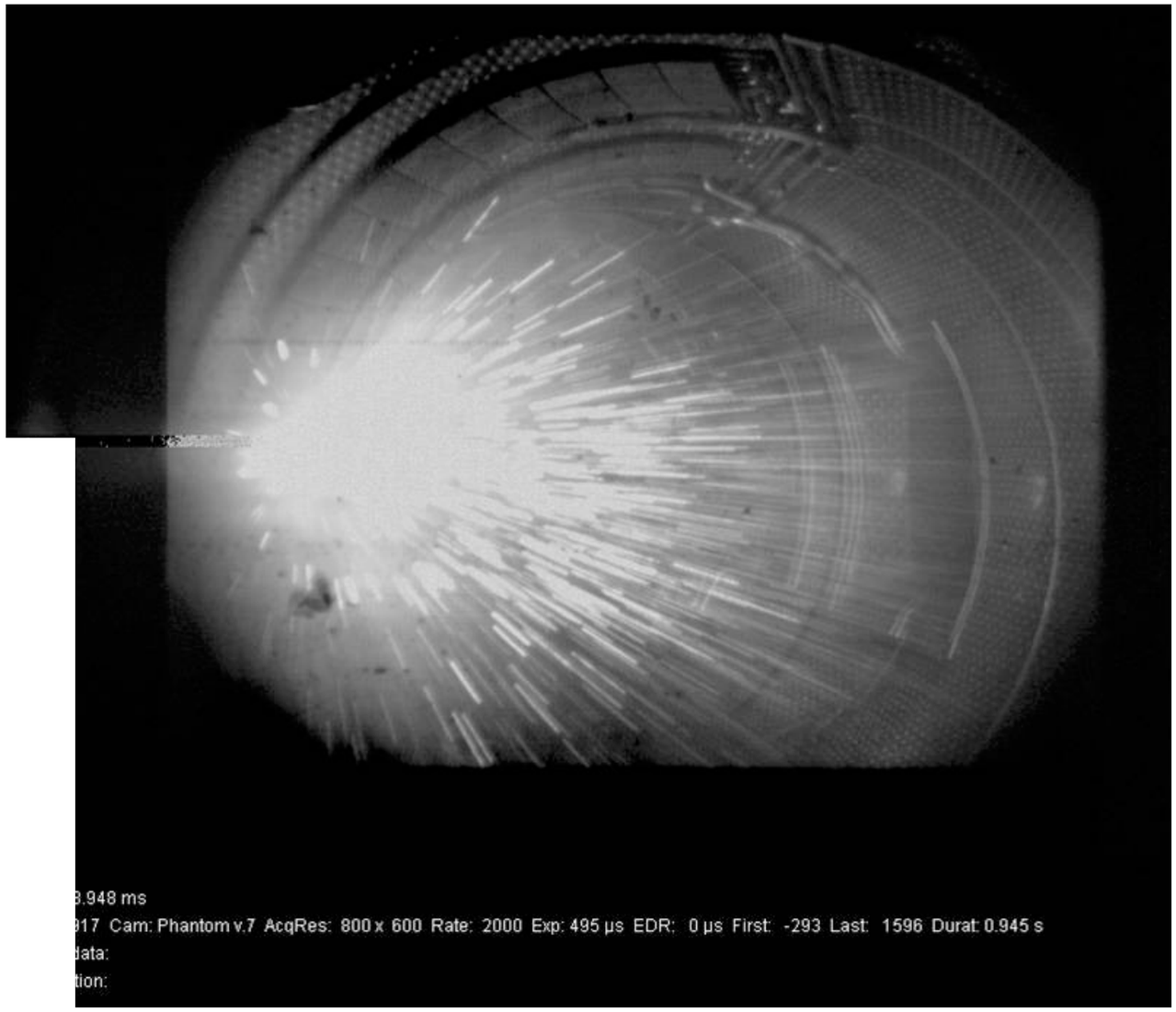
introductory

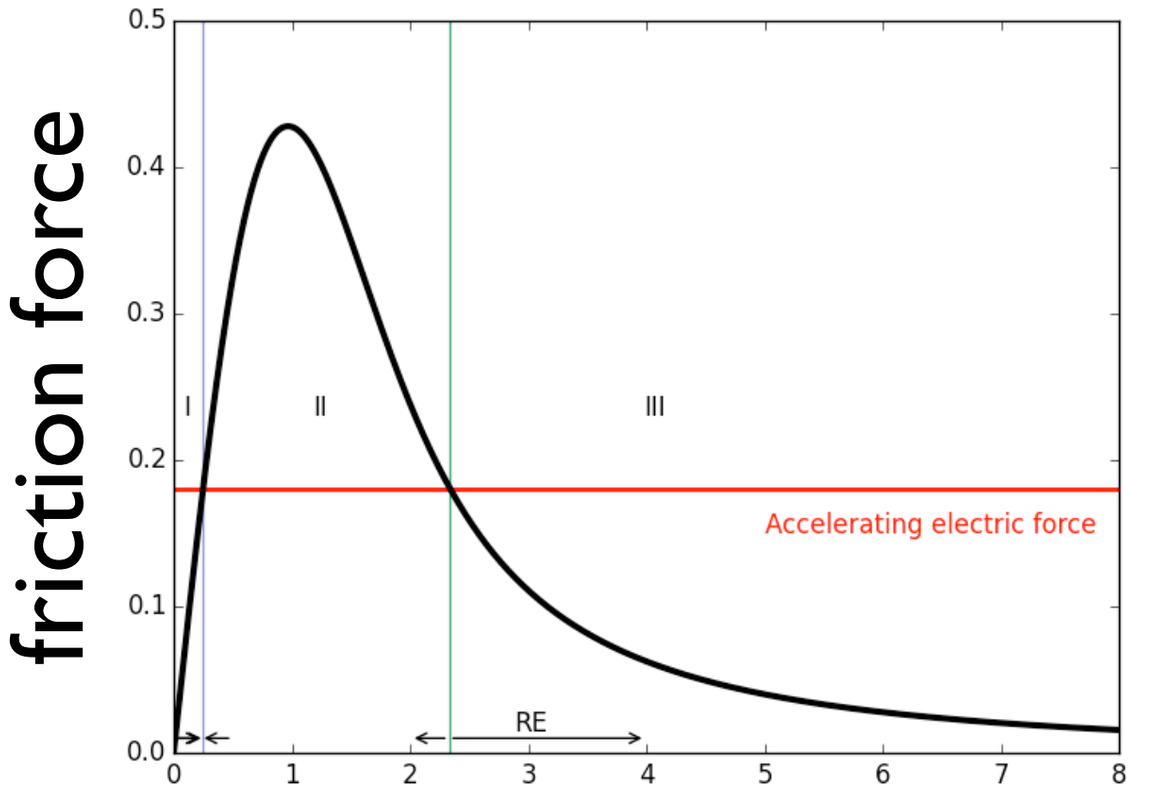
# Stellarators

basic concepts
confinement
experiments

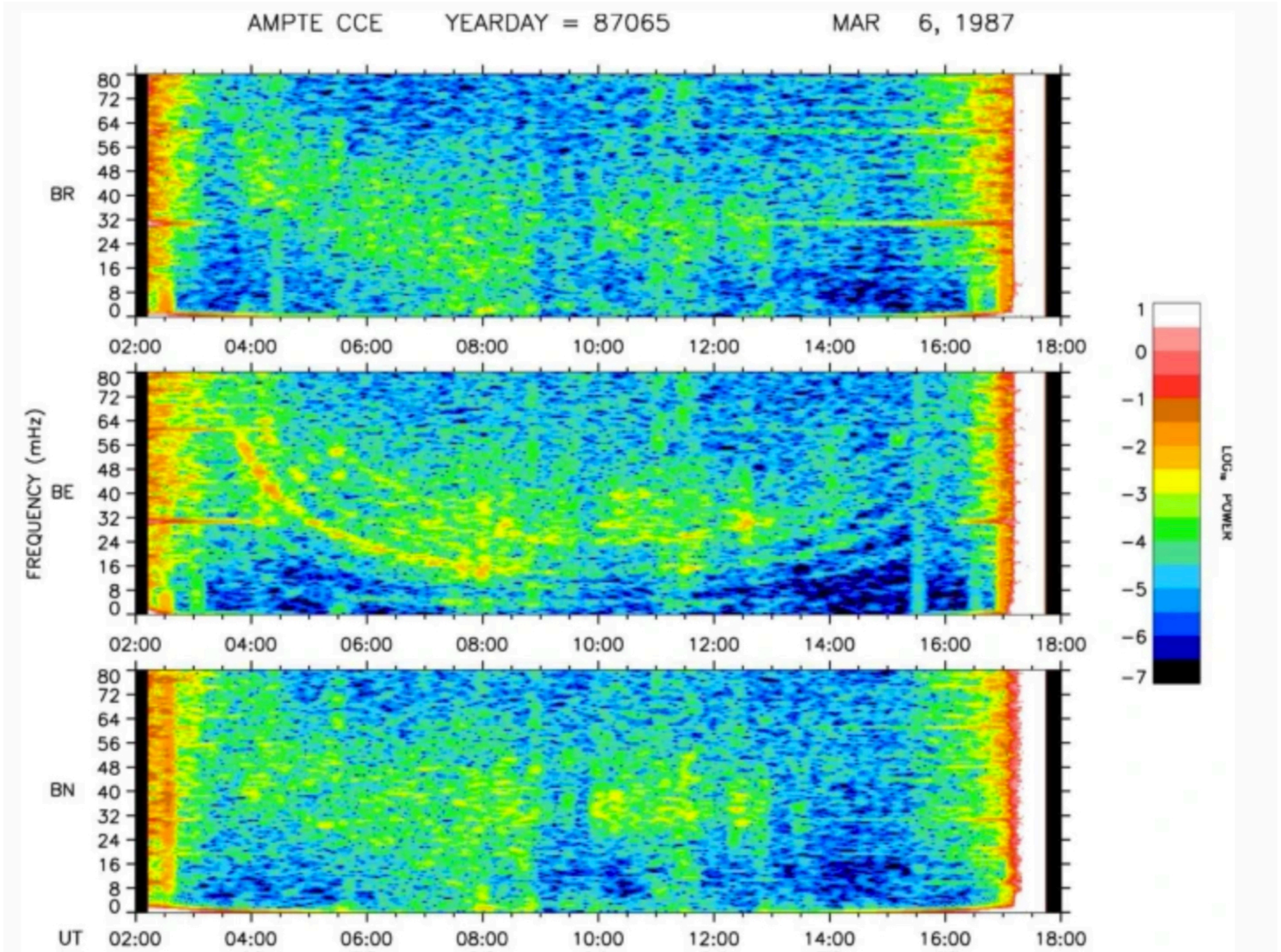


# Runaway electrons



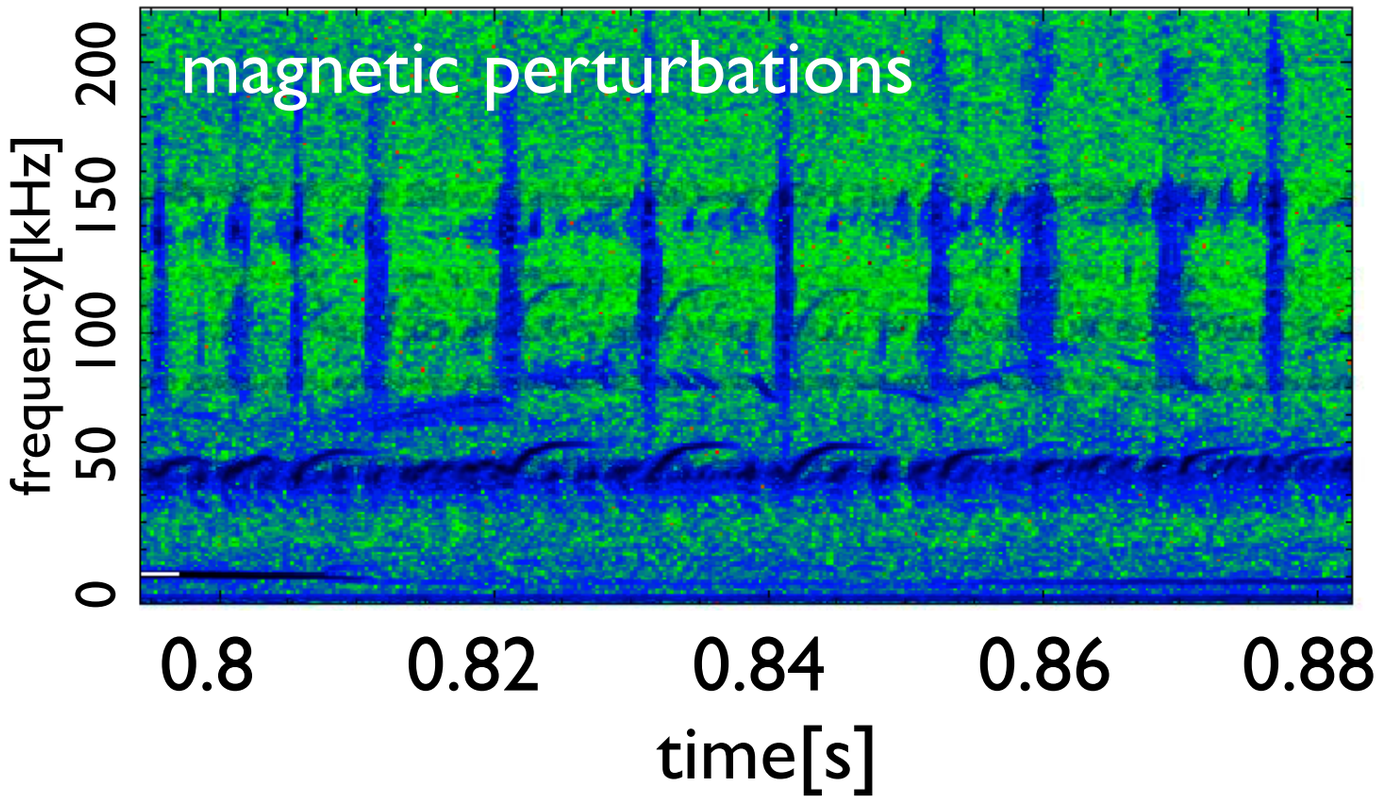



# Kinetic Alfvén waves: theory, applications in space/astro/fusion



# Energetic Ions in Tokamaks

## Alfvén waves, resonant interaction, non-linear saturation

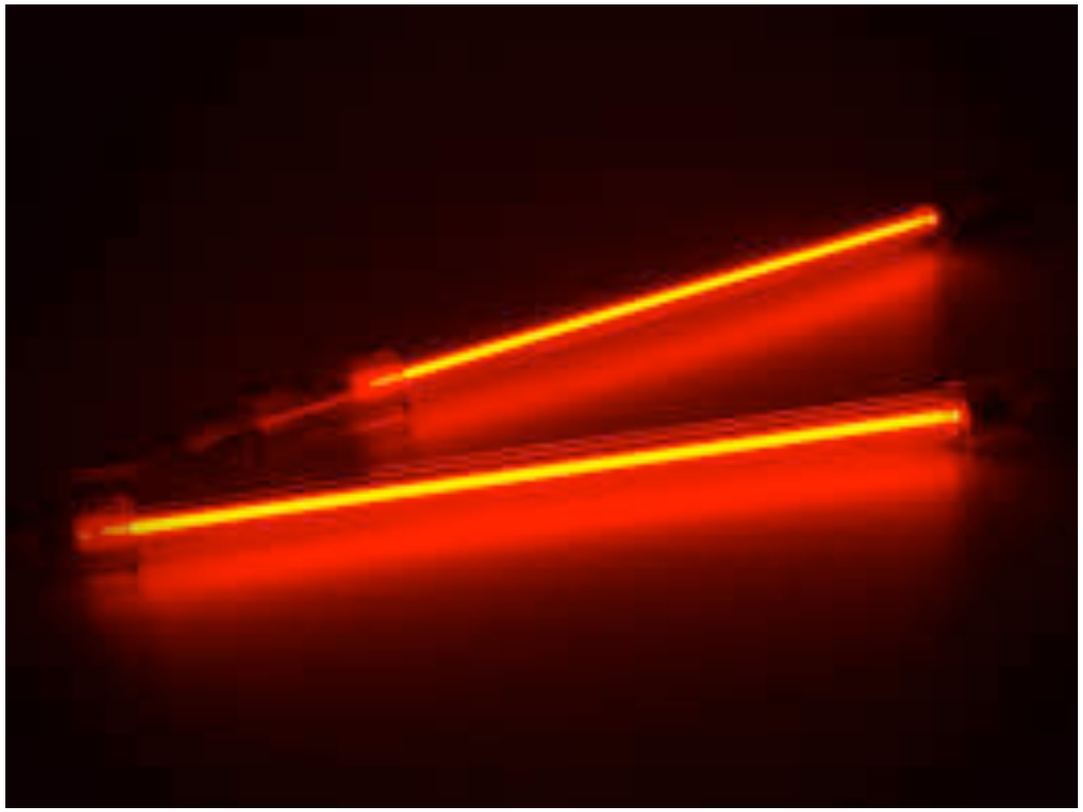


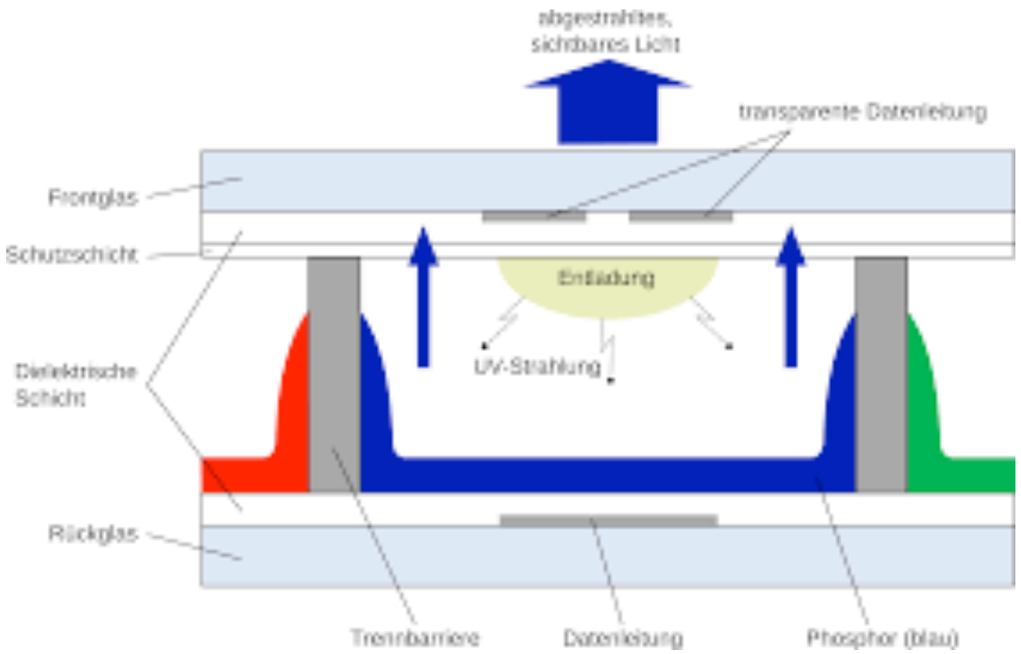

1.theoretical framework

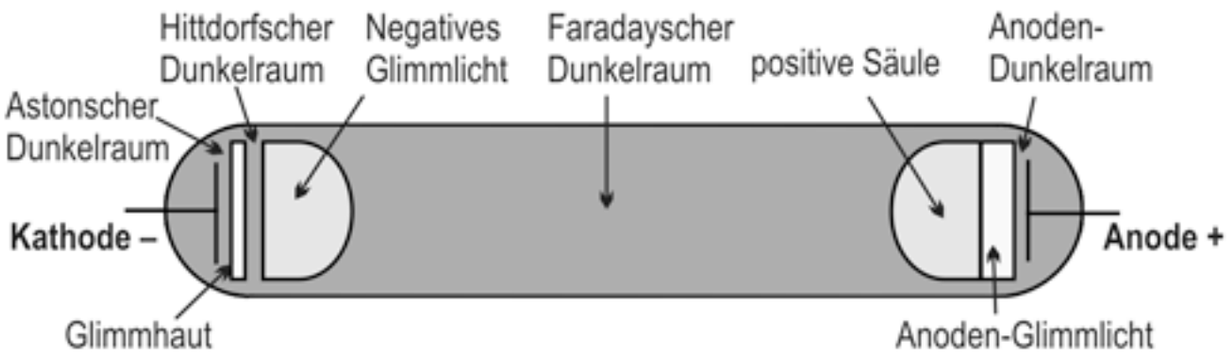
2. experiment

introductory

# Low temperature plasmas: principles and applications

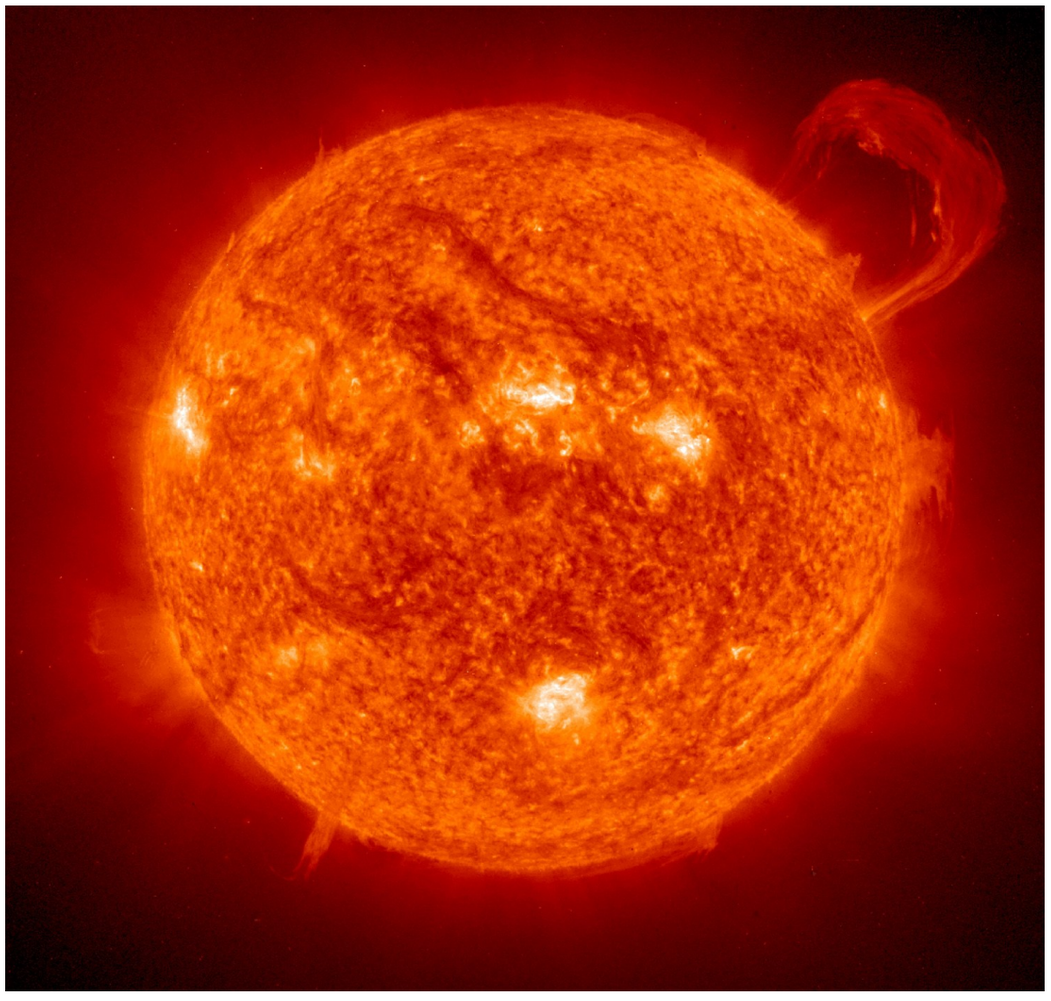


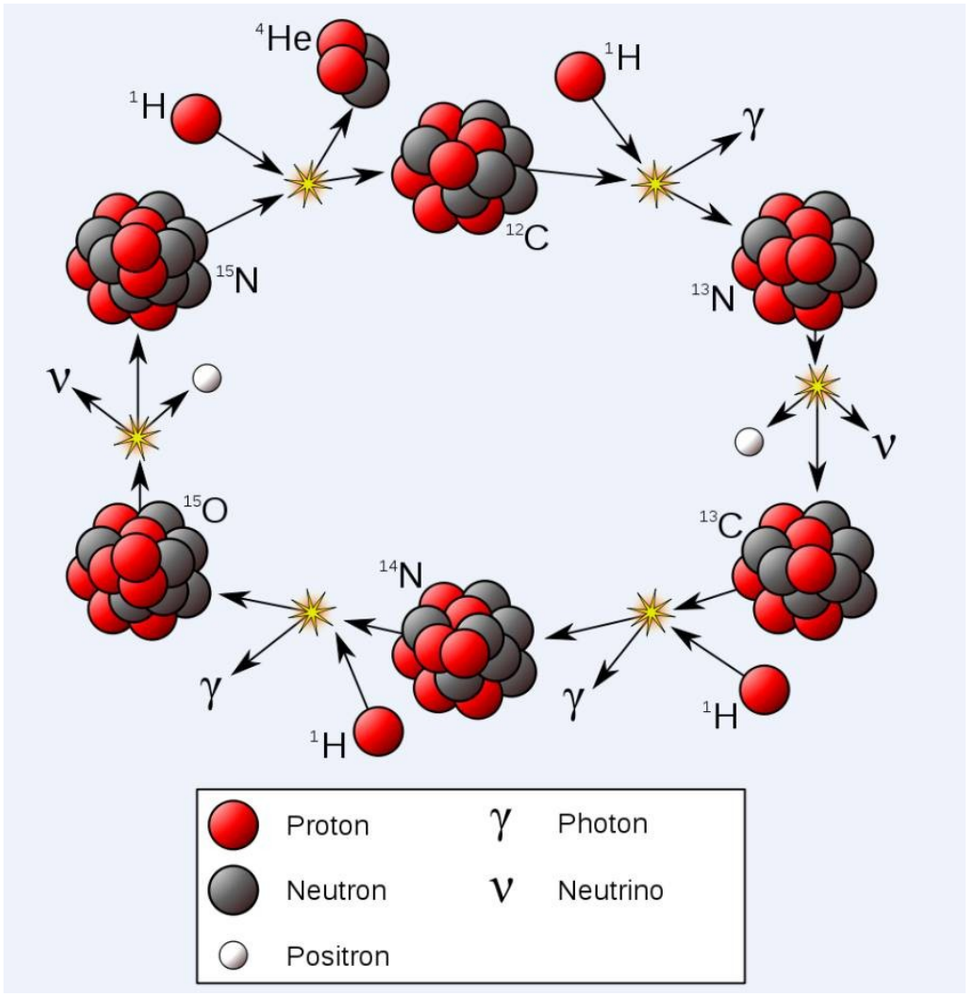


# Plasma Thrusters

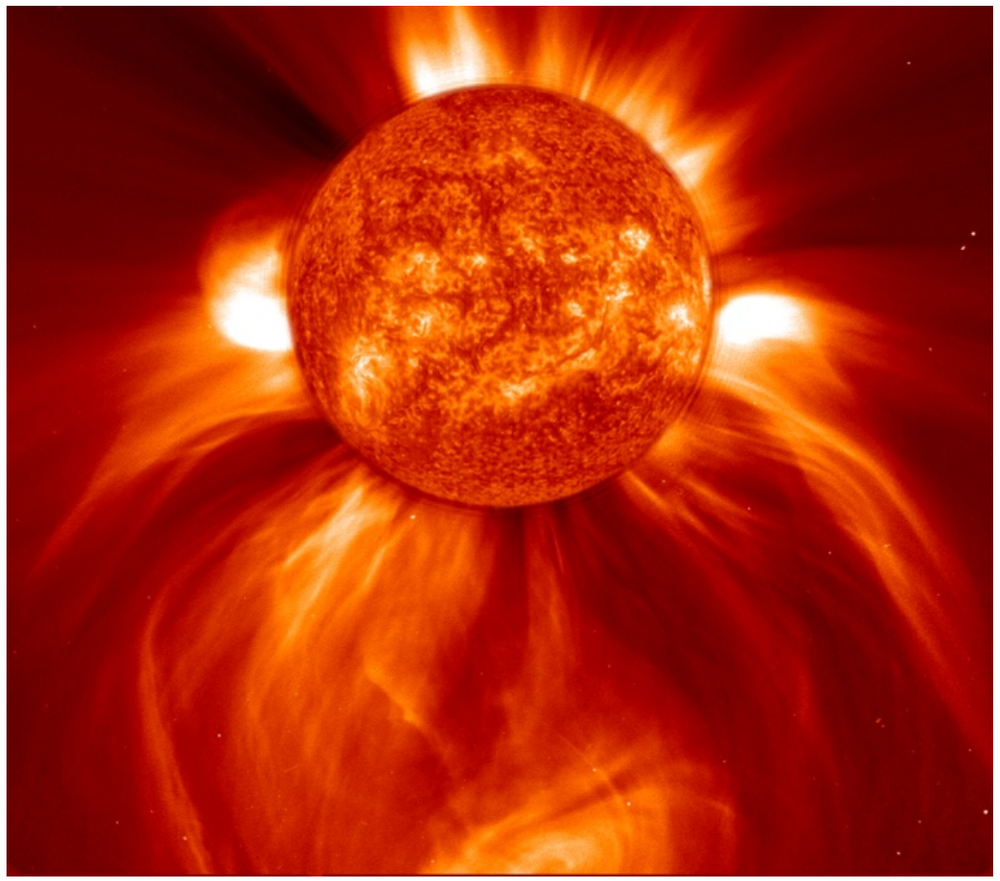
# The Sun



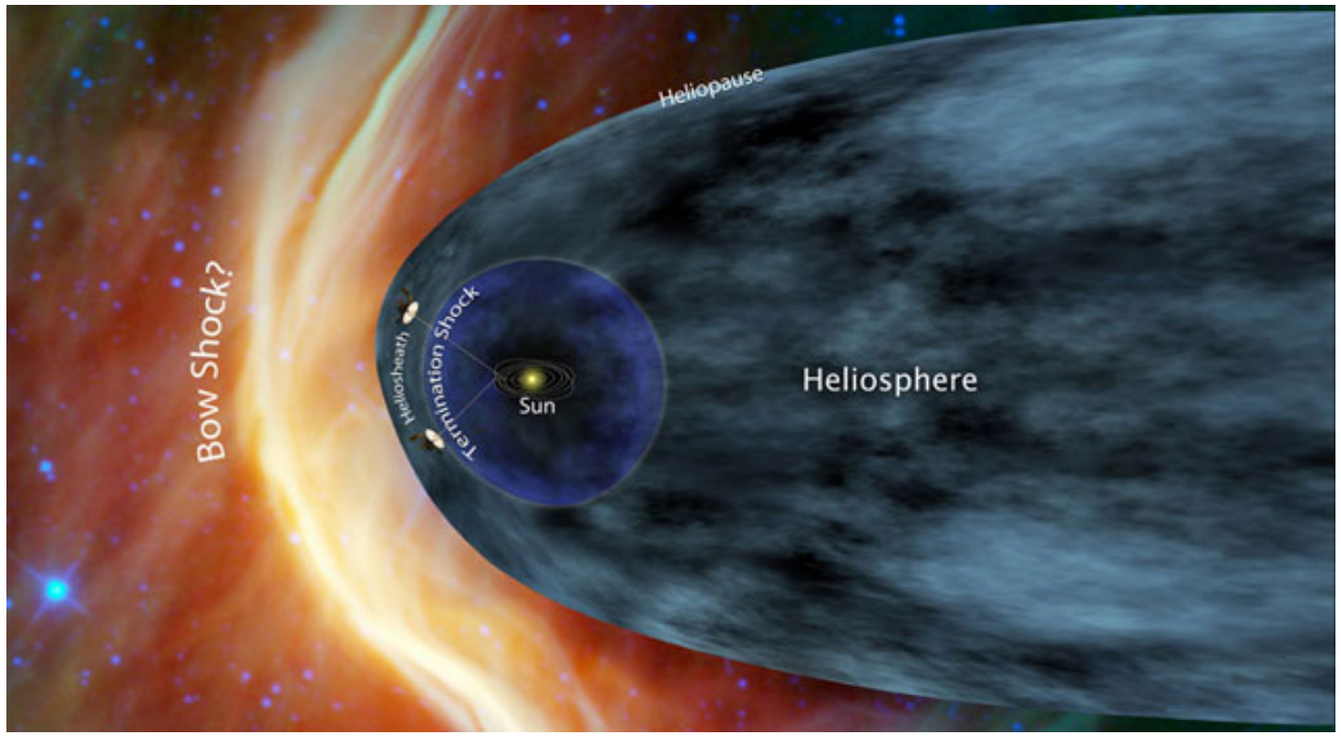



nuclear processes, solar structure, solar equilibrium and equations of state, radiation transport, convection

# The solar Corona and the solar wind



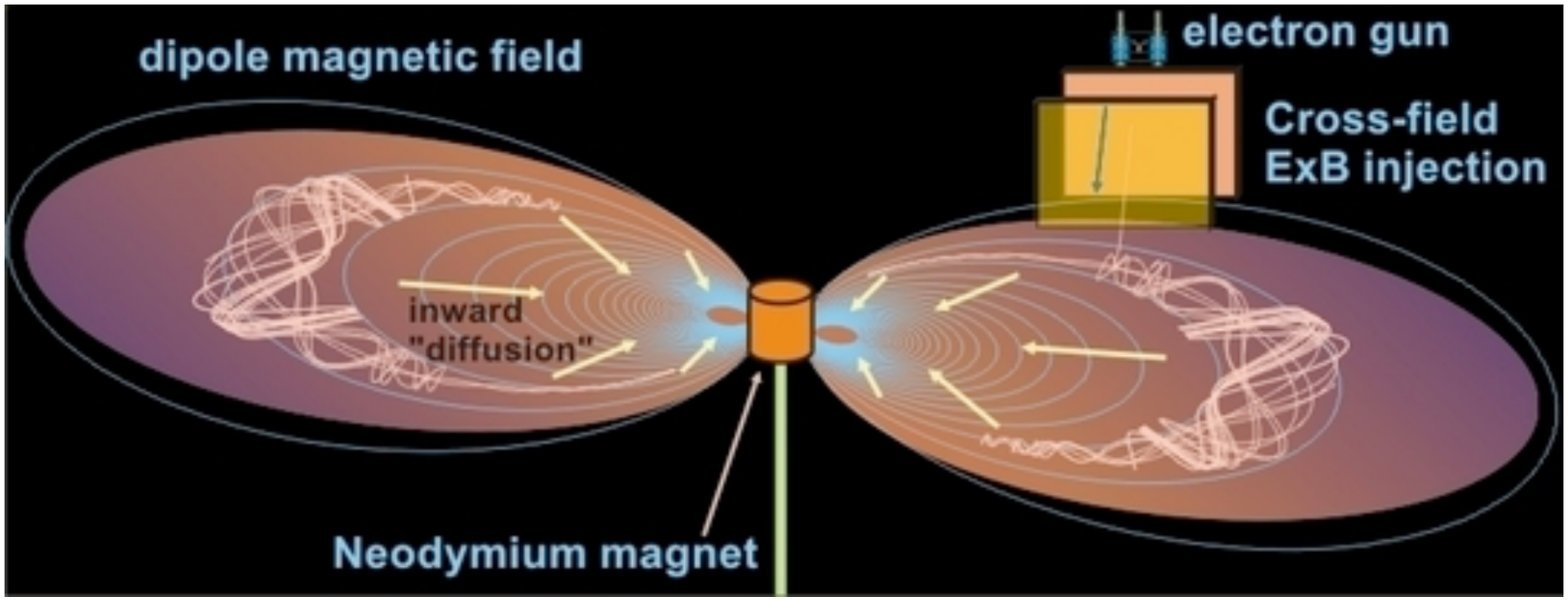
NASA, easa/SOHO




solar structure, magnetic fields in the sun(dynamo), solar spots, the corona heating problem

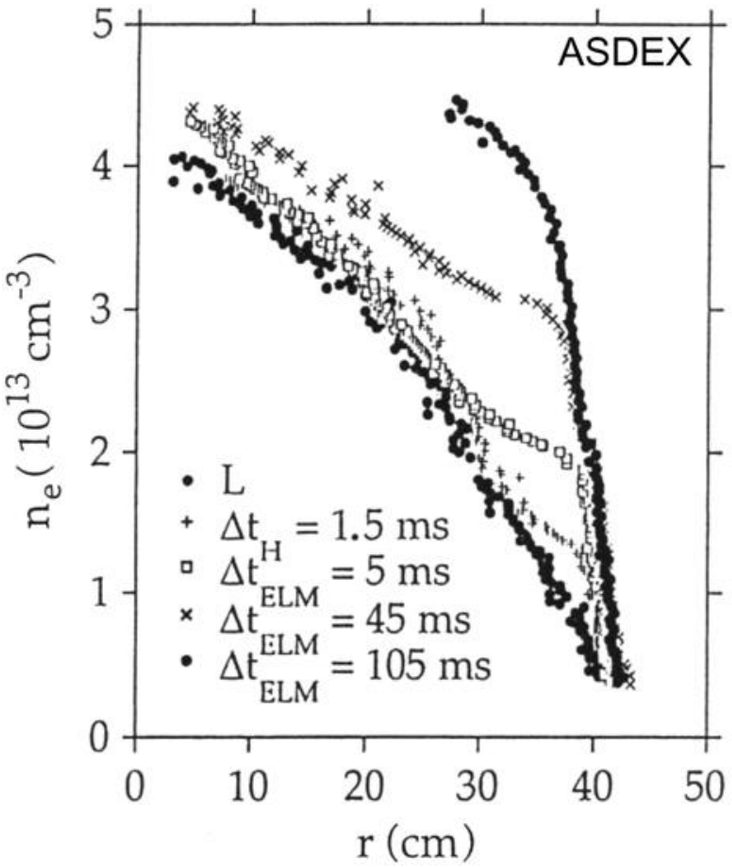
history, origin, Chapman model (static), Parker Model, interaction with earth magnetic field

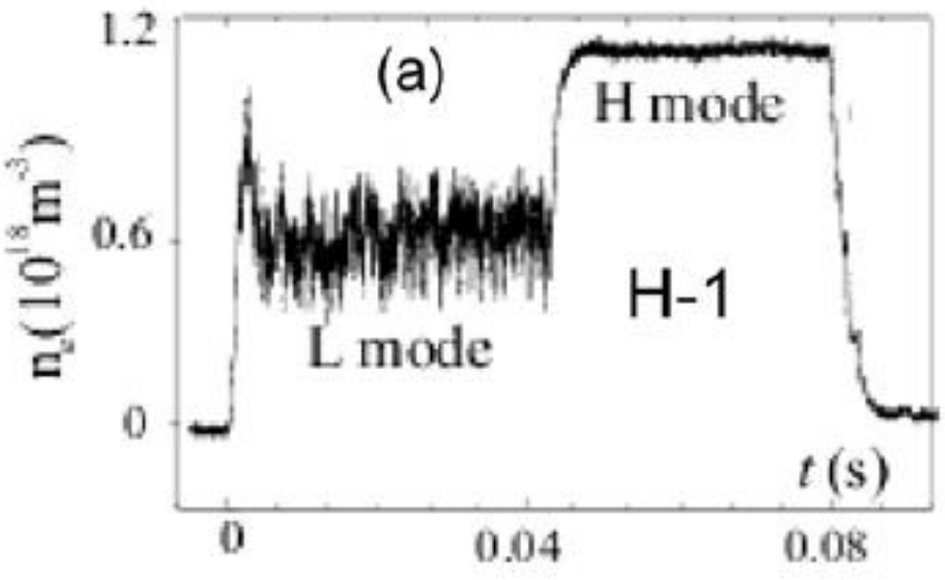
# Electron-Positron Plasmas




theoretical properties, experimental setup

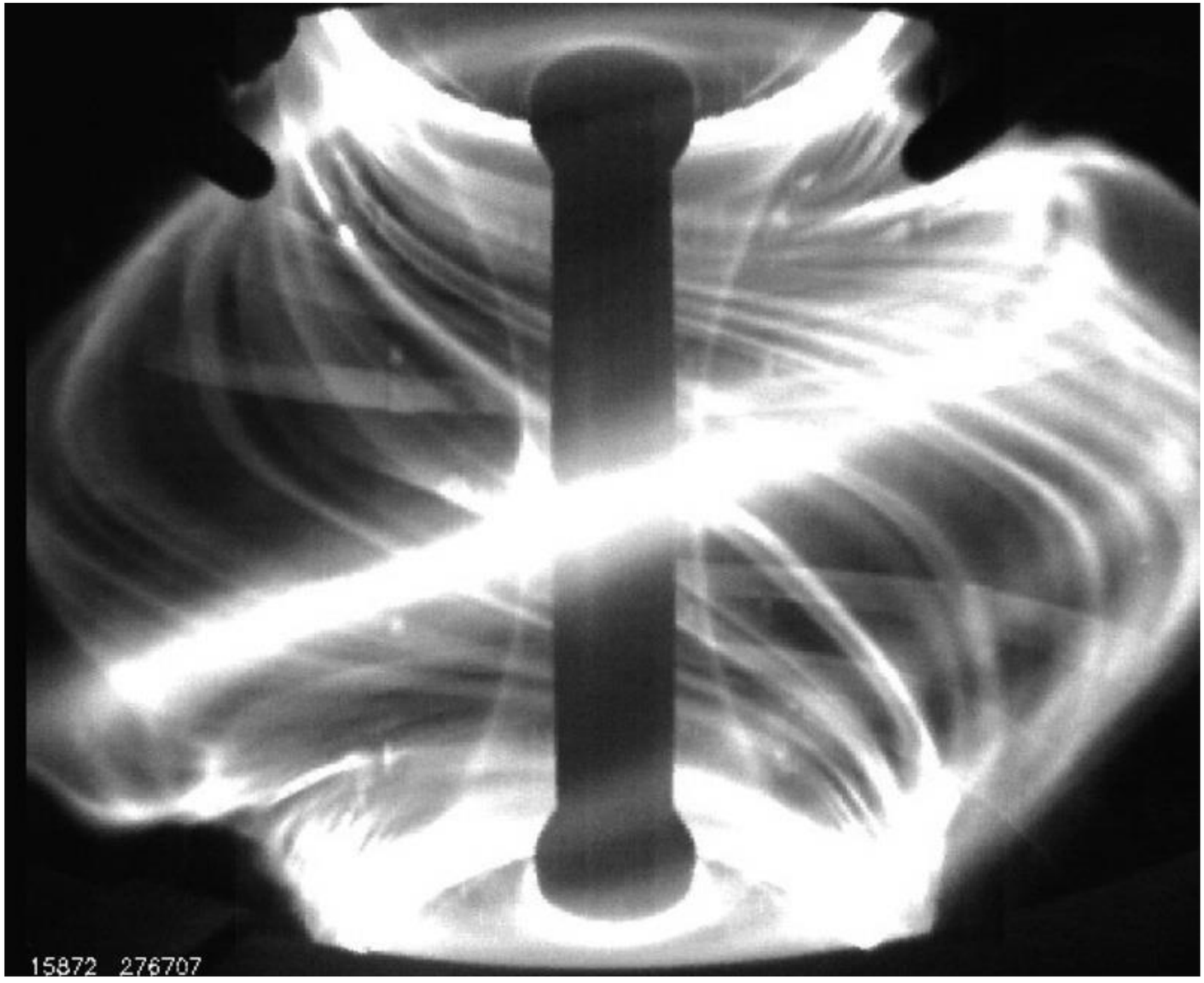
# Confinement regimes



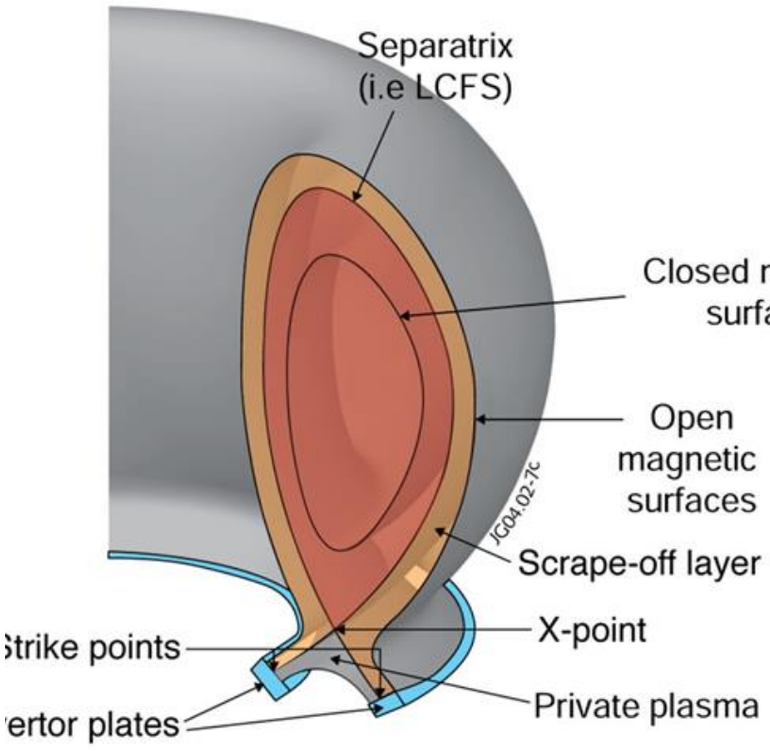



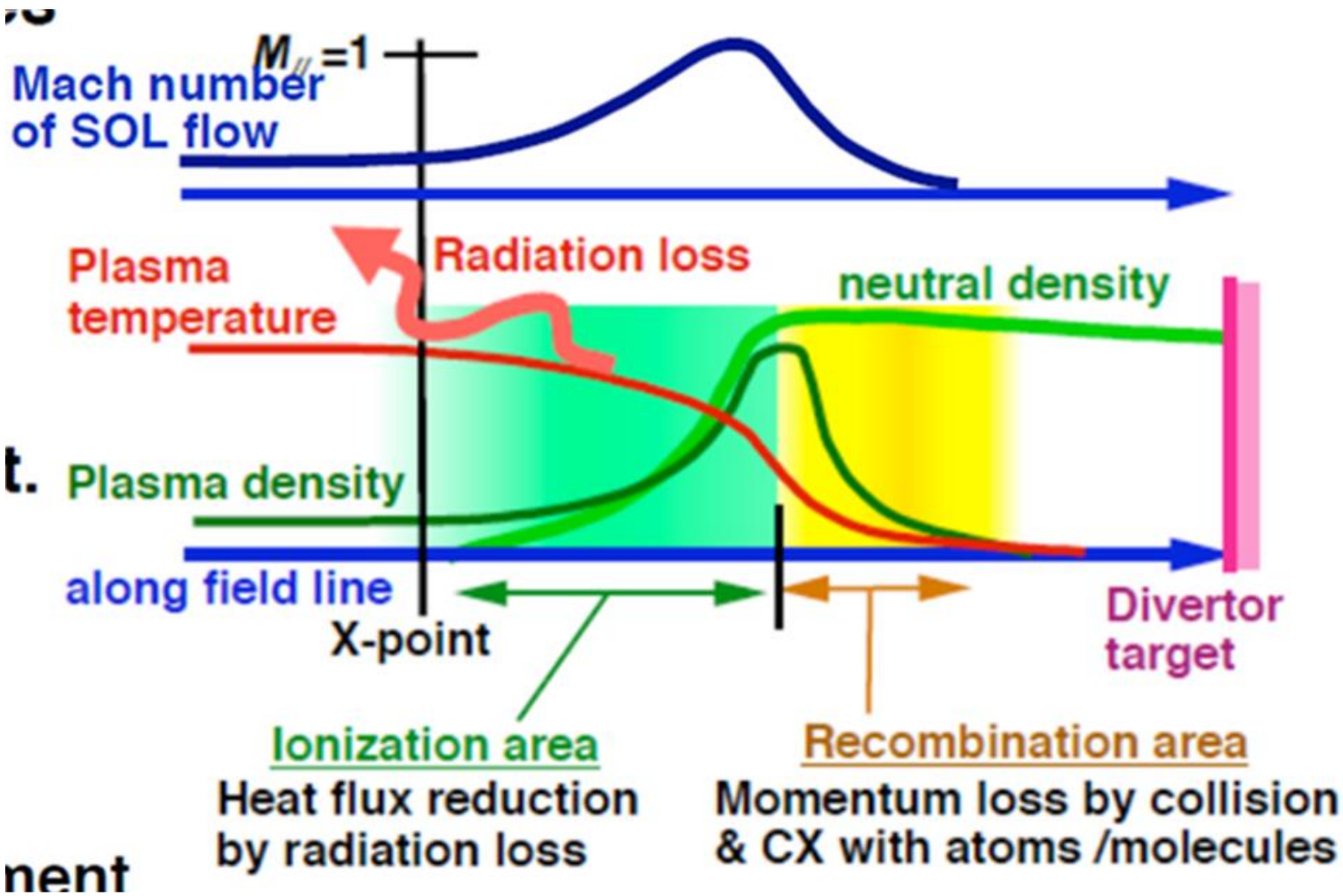

L-mode, H-mode, I-phase, I-mode, QH-mode, EDA-H-mode, Super-H-mode
turbulence, magnetic confinement, transport barriers

# H-mode ELMs

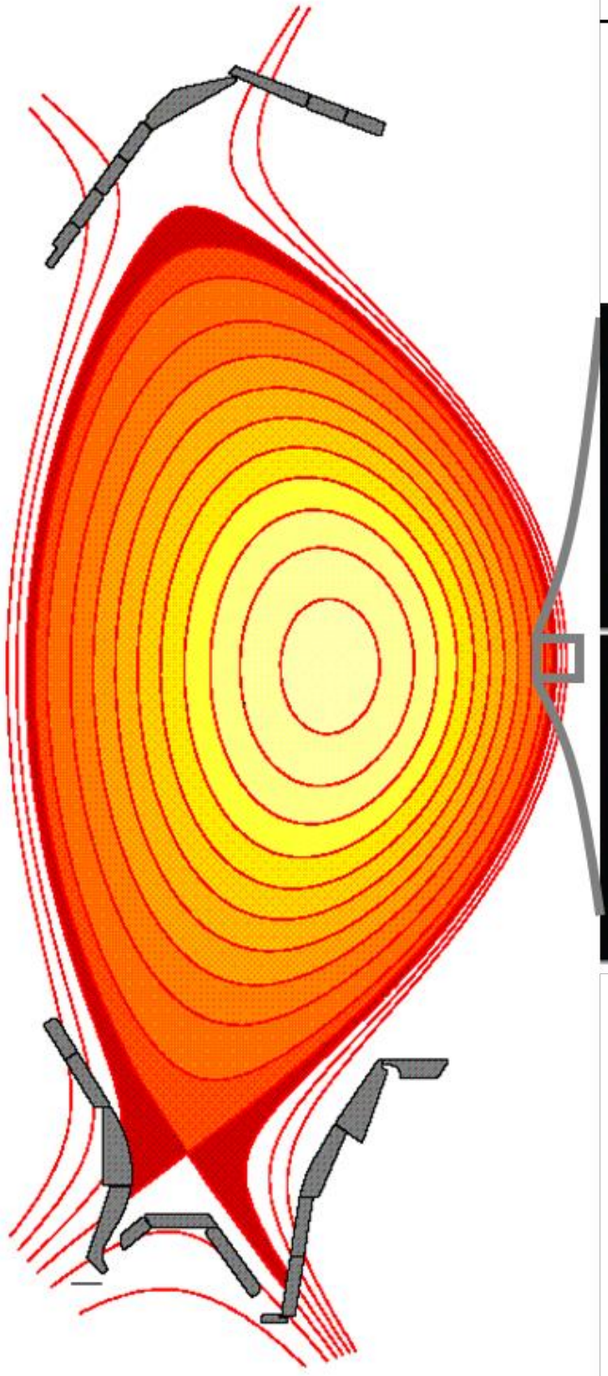


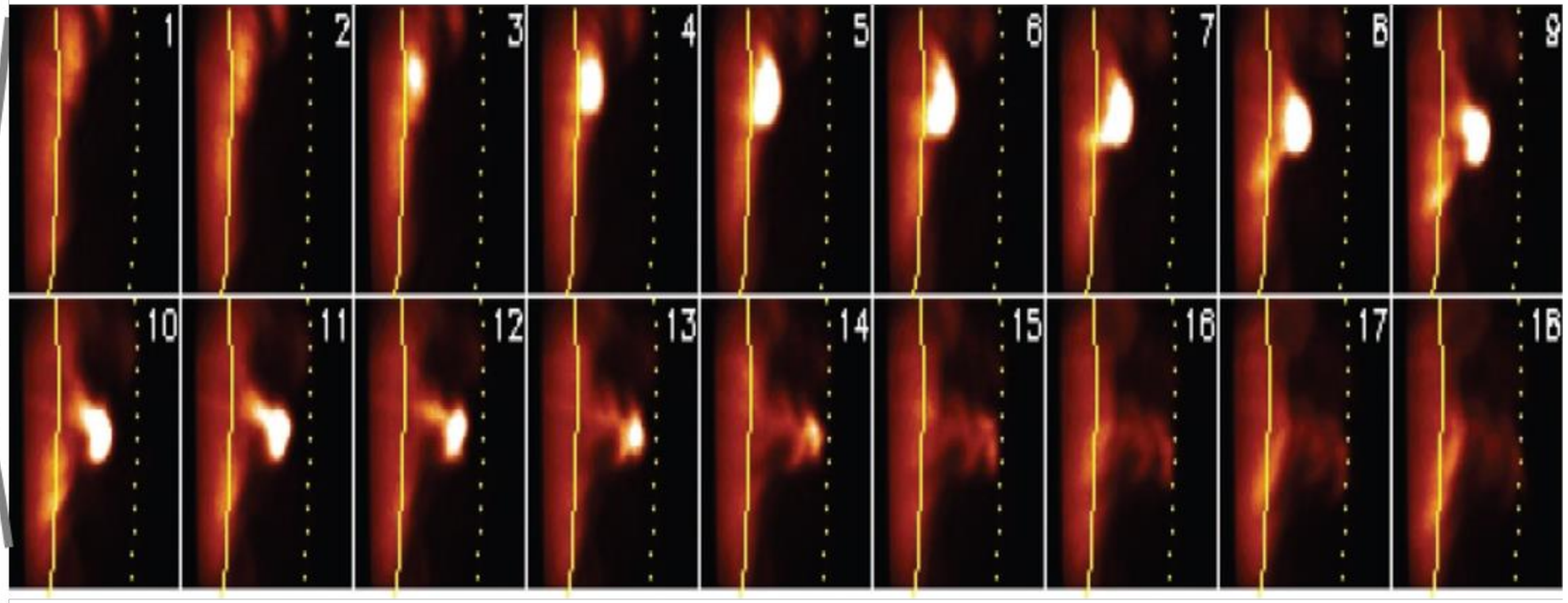
# Divertor detachment



# Plasma filaments in the scrape-off layer






+ Plasmadiagnostiken…