SOKENDAI CampusPlan Web Service

Syllabus Reference

Course title	Basic Seminar ⅡC		
Term	後期 2nd Half		
Credit(s)	2		
The main day		The main period	
School/Program	School of Physical Sciences		
Department/Program	Department of Astronomical Science		
Category	Common		
Lecturers	Maria Dainotti		

Instructor

Full name
* Dainotti, Maria Giovanna

Outline	High-energy astrophysics involves the study of powerful and energetic phenomena occurring in objects, such as black holes, neutron stars, supernova remnants, Gamma-Ray Burst, Active Galactic Nuclei. - Interaction of high energy particles with matter: ionization, bremsstrahlung, Synchrotron radiation, Compton scattering, inverse Compton -Plasma physics -example of the spectrum from GRBs
Goal	The goal of this course is for the students to enhance their knowledge of specific topics in high energy astrophysics and facilitate the student learning of problem-solving and independent thinking and exercise the way of organizing and delivering the material of the course. The problem solving will be performed through learning to solve the exercises from the book. Independent thinking can be exercised by trying different solutions to the same exercise in the text book. The organization and delivery of the material will happen through means which are the most suitable for the students, power point presentation, on the white board, on iPad sharing screen etc.

Grading system

	Grading system
Grading system	01:Four-grade evaluation (A,B,C,D)

Grading policy	60% of the grading policy is based on the presence in the class-room and in active participation in the lectures. The other 40% is based on the performance of the students when they have to deliver their assignments. Each student will have several assignments during the duration of the course depending on the number of students.
Lecture Plan	21 October Introduction of the course and revision of luminosities and fluxes definition 28 October BREMSSTRAHLUNG :Emission from Single-Speed Electrons; Thermal Bremsstrahlung Emission 4 November Thermal Bremsstrahlung (Free-Free) Absorption; Relativistic Bremsstrahlung 11 November Exercises from Bremstralung 5.1, 5.2 18 November SYNCHROTRON RADIATION: Total Emitted Power; Spectrum of Synchrotron Radiation: A Qualitative Discussion; Spectral Index for Power-Law Electron 25 November Spectrum and Polarization of Synchrotron Radiation: A Detailed Discussion; Polarization of Synchrotron Radiation; exercise 6.1; 6.2 2 December Transition from Cyclotron to Synchrotron Emission; Distinction between Received and Emitted Power; exercise 6.3 9 December Synchrotron Self-Absorption; exercise 6.4 The Impossibility of a Synchrotron Maser in Vacuum; exercise 6.5 16 December Compton Scattering: Cross Section and Energy Transfer for the Fundamental Process; Inverse Compton Power for Single Scattering Exercise 7.1

	23 Inverse Compton Spectra for Single Scattering; Energy Transfer for Repeated Scatterings in a Finite, Thermal Medium: The Compton Y Parameter; exercise 7.2 6 January Inverse Compton Spectra and Power for Repeated Scatterings by Relativistic Electrons; exercise 7.3 13 January Repeated Scatterings by Nonrelativistic Electrons: practical exercise on how to compute a spectrum of a Gamma-Ray Burst from a we-based repository. 20 January The Kompaneets Equation; Spectral Regimes for Repeated Scattering by Nonrelativistic Electrons; exercise 7.4 27 Plasma effects: Dispersion in Cold, Isotropic Plasma;Propagation Along a Magnetic Field; Faraday Rotations. exercise 8.1 3 February Plasma Effects in High-Energy Emission Processe. Exercise 8.2 and 8.3
Location	Mitaka Campus, Lecture room
Language	English
Textbooks and references	Radiative Processes in Astrophysics, Geroge Rybicki, Alan Lightman. Theory and exercises
Others	The first lecture will entail a presentation of each student among others and the assignment to the students for the next lectures. Each student starting from the second lecture will present a topic. For example student 1 exercise 1.1, student 2 exercise 2, etc. The number of students at each lecture will be determined based on the number of students registered in the course.
Keyword	High energy astrophysics, Bremsstrahlung, synchrotron, Compton emission, Plasma effects,

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