

シラバス参照

講義名	天文科学基礎演習ⅡC		
講義開講時期	後期 2nd Half		
基準単位数	2		
代表曜日		代表時限	
研究科等	物理科学研究科		
専攻・プログラム	天文科学専攻		
科目区分	共通		
授業を担当する教員			

担当教員

氏名
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授業の概要	<p>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.</p> <p>- Interaction of high energy particles with matter: ionization, bremsstrahlung, Synchrotron radiation, Compton scattering, inverse Compton -Plasma physics -example of the spectrum from GRBs</p>
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到達目標	<p>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.</p> <p>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.</p>
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成績評価基準

成績評価基準	成績評価基準
成績評価基準	01:A, B, C, Dの4段階評価

成績評価方法	<p>60% of the grading policy is based on the presence in the class-room and in active participation in the lectures.</p> <p>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.</p>
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授業計画	<p>21 October Introduction of the course and revision of luminosities and fluxes definition</p> <p>28 October BREMSSTRAHLUNG :Emission from Single-Speed Electrons; Thermal Bremsstrahlung Emission</p> <p>4 November Thermal Bremsstrahlung (Free-Free) Absorption; Relativistic Bremsstrahlung</p> <p>11 November Exercises from Bremsstrahlung 5.1, 5.2</p> <p>18 November SYNCHROTRON RADIATION: Total Emitted Power; Spectrum of Synchrotron Radiation: A Qualitative Discussion; Spectral Index for Power-Law Electron</p> <p>25 November Spectrum and Polarization of Synchrotron Radiation: A Detailed Discussion; Polarization of Synchrotron Radiation; exercise 6.1; 6.2</p> <p>2 December Transition from Cyclotron to Synchrotron Emission; Distinction between Received and Emitted Power; exercise 6.3</p> <p>9 December Synchrotron Self-Absorption; exercise 6.4 The Impossibility of a Synchrotron Maser in Vacuum; exercise 6.5</p> <p>16 December Compton Scattering: Cross Section and Energy Transfer for the Fundamental Process: Inverse Compton Power for Single Scattering Exercise 7.1</p> <p>23 Inverse Compton Spectra for Single Scattering; Energy Transfer for Repeated Scatterings in a</p>
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	<p>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 Processes. Exercise 8.2 and 8.3</p>
実施場所	Mitaka Campus, Lecture room
使用言語	English
教科書・参考図書	Radiative Processes in Astrophysics, George Rybicki, Alan Lightman. Theory and exercises
備考	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.
キーワード	High energy astrophysics, Bremsstrahlung, synchrotron, Compton emission, Plasma effects,

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