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| Study programmes: BACHELOR STUDIES – Astronomy and Astrophysics | | | |
| Course name: Electrodynamics 1 | | | |
| Lecturers: Voja Radovanović and other lecturers | | | |
| Status: Optional | | | |
| ECTS: 5 | | | |
| Attendance prerequisites: Electromagnetism, Mathematics 3. | | | |
| Course aims: Understanding basic concepts, methods and laws of electrodynamics. | | | |
| Course outcome: The students should learn and understand basic principles of Electrodynamics: gauge symmetry, Lorentz symmetry of Electrodynamics, energy, momentum and angular momentum of classical electromagnetic field, etc. | | | |
| Course content: 1. Charge and electromagnetic field. Dirac delta function. Continuity equation. 2. Electrostatics. Coulomb Law. Gauss Law. Multipole expansion of scalar potential. Electric dipole and quadrupole. 3. Magnetostatics. Biot-Savart Law. Ampere Law. Multipole expansion of vector potential. Magnetic dipole. 4. Faraday law. Maxwell equation. 5. Potentials of electromagnetic field. Gauge invariance. 6. Maxwell equation in macroscopic media. Constitutive equations. Boundary conditions. 7. Poynting theorem. Energy of electrostatic and magnetostatics fields. Joule Heating. 8. Momentum and angular momentum of field. Maxwell stress tensor. 9. Four potential and four current density. Field strength tensor. Transformation of electromagnetic field. 10. Particle in electromagnetic field. Lagrangian and Hamiltonian. Equations of motion and their covariance. 11. Action and equations of motion for electromagnetic field. 12. Spatial reflection and time reversal. 13. Electrodynamics of moving media. | | | |
| Literature: 1. J. D. Jackson, Classical Electrodynamics, J. Wiley and Sons (1999) 2. V. Radovanović, Elektrodinamika, Beograd (2017) 3. L. Landau and L. Lifshitz, Classical Theory of Fields, Butterworth-Henemann (1975) 4. B. Milić, Maksimalna elektrodinamika, Beograd (2002) 5. A. Zangwill, Modern Electrodynamics, (2013) 6. V. V. Batygin and I. N. Toptygin, Problems in Electrodynamics, Academic Press (1964) | | | |
| Number of hours: 4 | Lectures: 2 | Tutorials: 2 | Laboratory: - Research: - |
| Teaching and learning methods: Frontal / Tutorial | | | |
| Assessment (maximal 100 points) | | | |
| Course assignments | points | Final exam | points |
| Lectures | 10 | Written exam | 30 |
| Exercises / Tutorials | - | Oral exam | 40 |
| Colloquia | - | Written-oral exam | - |
| Essay / Project | 20 | | |