Univerza v Novi Gorici
Fakulteta za aplikativno naravoslovje

University of Nova Gorica
School of Applied Sciences

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Pospeševanje in transport nabitih delcev
Course name:	Acceleration and transport of charged particles

Študijski program in stopnja **Study program and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Fizika in Astrofizika II. stopnja	Astrofizika	1	/
Physics and Astrophysics II. level	Astrophysics	1	/

Vrsta predmeta / Course type	obvezni / mandatory
Univerzitetna koda predmeta / University course code:	2FAF07

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Lab. work**	**Teren. vaje** **Field work**	**Samost. delo** **Indiv. work**	**ECTS**
30	/	30	/	/	120	6

Nosilec predmeta / Lecturer:	prof. dr. Samo Stanič	
Jeziki / Languages:	**Predavanja / Lectures:**	slovenščina / English
	Vaje / Tutorial:	slovenščina / English

Pogoji za opravljanje študijskih obveznosti:	**Prerequisits:**
/	/

Vsebina:	**Syllabus outline:**
1. Uvod, zgodovinski pregled laboratorijskih pospeševalnikov - Linearni pospeševalniki - Krožni pospeševalniki 2. Nabiti delci v elektro-magnetnem polju - Linearizirane enačbe gibanja - Periodični sistemi zbiranja žarka - Pospeševanje paketov nabitih delcev - Sinhrotronsko sevanje - Parametri žarka nabitih delcev in njegov življenjski čas - Kolektivni pojavi 3. Pospeševanje delcev v astrofizikalnih izvorih	1. Introduction and historical overview - Linear accelerators - Circular accelerators 2. Motion of charged particles in EM field - Linearized equations of motion - Beam focusing systems - Acceleration systems - Synchrotron radiation - Beam parameters and its lifetime - Collective effects 3. Acceleration of charged particles in astrophysical sources

Temeljni literatura in viri / Basic readings:
H. Wiedemann, Particle Accelerator Physics, Springer (2007). K. Wille, The physics of particle accelerators: An Introduction, Oxford University Press (2001). H. Wiedemann, Particle Accelerator Physics II, Springer (1995). M. S. Longair, High Energy Astrophysics, Cambridge University Press, 3 edition (2011).

Cilji in kompetence:	**Objectives and competences:**
Študenti bodo spoznali delovanje, fizikalno podlago in uporabo pospeševalnikov nabitih delcev, ki se uporabljajo v eksperimentalni fiziki osnovnih delcev, raziskovanju materialov, medicini in drugje. Spoznali bodo tudi osnovne mehanizme pospeševanja v astrofizikalnih izvorih.	Students will learn the basics of particle accelerators design and operation, including the underlying physical conepts and their possible applications. They will also learn basic mechanisms of particle acceleration in astrophysical sources.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Študenti bodo osvojili pojme in koncepte: - razumevanje osnov zgradbe in delovanja pospeševalnikov nabitih delcev in z njimi povezanih izvorov svetlobe; - spoznavanje področij njihove uporabe.	Students will learn: - understanding of the basics of particle accelerator design and operation, including light sources; - introduction to possible application of particle accelerators in basic science, aplicative science and medicine.

Metode poučevanja in učenja:	**Learning and teaching methods:**
- predavanja - študentske predstavitve - skupinsko delo	- lectures - student presentations - team work

Načini ocenjevanja:	**Utež / Weight (%)**	**Assessment:**
- seminarska naloga - predstavitev	50 50	- written report - oral presentation

Reference nosilca / references of the course principal:
Prof. dr. Samo Stanič je redni profesor za področje fizike na Univerzi v Novi Gorici. Samo Stanič is full professor of physics at the University of Nova Gorica.

1. Belle Collaboration, LIN, S.-W., BITENC, Urban, BRAČKO, Marko, FRATINA, Saša, GOLOB, Boštjan, KORPAR, Samo, KRIŽAN, Peter, PESTOTNIK, Rok, STANIČ, Samo, STARIČ, Marko, ZUPANC, Anže, et al. Difference in direct charge-parity violation between charged and neutral B meson decays. *Nature*, ISSN 0028-0836. [Print ed.], 2008, vol. 452, str. 332-335. [COBISS.SI-ID 21553703]

2. Belle Collaboration, ABE, R., STANIČ, Samo, ŽONTAR, Dejan, et al. Observation of large CP violation in the neutral B meson system. *Physical review letters*, ISSN 0031-9007. [Print ed.], 2001, vol. 87, str. 091802-1-091802-7. [COBISS.SI-ID 16648231]

3. STANIČ, Samo, ŽONTAR, Dejan, et al. Radiation monitoring in Mrad range using radiation-sensing field-effect transistors. *Nuclear instruments and methods in physics research. Section A, Accelerators, spectrometers, detectors and associated equipment*, ISSN 0168-9002. [Print ed.], 2005, vol. 545, str. 252-260. [COBISS.SI-ID 19097895]

4. AUGER Collaboration, ABREU, P., CREUSOT, Alexandre, FILIPČIČ, Andrej, PAUL, Thomas, STANIČ, Samo, VEBERIČ, Darko, ZAVRTANIK, Danilo, ZAVRTANIK, Marko, et al. Measurement of the proton-air cross section at [sqare root] s = 57 TeV with the Pierre Auger Observatory. *Physical review letters*, ISSN 0031-9007. [Print ed.], 2012, vol. 109, no. 6, str. 062002-1-062002-9, doi: 10.1103/PhysRevLett.109.062002. [COBISS.SI-ID 2468347]

5. GAO, Fei, STANIČ, Samo, BERGANT, Klemen, BOLTE, Tanja, COREN, Franco, HE, Tingyao, HRABAR, Andrej, JERMAN, Jure, MLADENOVIČ, Ana, TURŠIČ, Janja, VEBERIČ, Darko, IRŠIČ ŽIBERT, Mateja. Monitoring presence and streaming patterns of Icelandic volcanic ash during its arrival to Slovenia. *Biogeosciences*, ISSN 1726-4170, 2011, vol. 8, no. 8, str. 2351-2363, doi: 10.5194/bg-8-2351-2011. [COBISS.SI-ID 1977339]