



UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Galaksije in kozmologija
Course name:	Galaxies and cosmology

Študijski program in stopnja Study program and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika in Astrofizika I. stopnja	/	2	2
Physics and Astrophysics I. level	/	2	2

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	1FAF15

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Teren. vaje Field work	Samost. delo Indiv. work	ECTS
45	/	15	/	/	120	6

Nosilec predmeta / Lecturer:	doc. dr. Gabrijela Zaharijas	
Jeziki / Languages:	Predavanja / Lectures:	slovenščina / English
	Vaje / Tutorial:	slovenščina / English

Pogoji za opravljanje študijskih obveznosti: Prerequisites:

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Vsebina:	Syllabus outline:
1. Naša Galaksija: morfologija, komponente, zgradba, rotacija in dinamika, masa in temna snov, medzvezdna snov, zvezdne populacije, središče Galaksije.	1. Our Galaxy: morphology, components, structure, rotation and dynamics, mass and dark matter, interstellar medium, stellar populations, Galactic centre.
2. Normalne galaksije: Hubblova klasifikacija, osnovne lastnosti, lestvica razdalj, določanje mase galaksij, temna snov, sodobni pregledi galaksij, izsevna funkcija galaksij, nastanek in razvoj, vpliv okolja, Lyman alfa gozd, hitrost nastajanja zvezd.	2. Normal galaxies: the Hubble classification, basic properties, distance ladder, mass determination, dark matter, modern surveys, the galaxy luminosity function, formation and evolution, effects of environment, Lyman alpha forest, star formation rate.
3. Aktivne galaksije: energije, dokaz za prisotnost črne luknje, vrste, enotni modeli.	3. Active galaxies: energetics, evidence for a black hole, types, unified models.
4. Prostorska porazdelitev galaksij: Lokalna skupina, jate galaksij, merjenje mase jat, temna	4. Spatial distribution of galaxies: The Local Group, clusters of galaxies, mass determination,



snov, struktura vesolja na velikih skalah.	dark matter, large-scale structure.
5. Kozmologija: zgodovina, opazovalni dokazi za prapok, uvod v prapok, prvinska nukleosinteza in prasevanje.	5. Cosmology: history, observational evidence for the Big Bang, introduction to the Big Bang, primordial nucleosynthesis and CMB emission.
6. Kozmološko načelo, Hubblov zakon, kozmološki rdeči premik, Friedmanova enačba, kozmološki modeli.	6. Cosmological principle, Hubble's law, cosmological redshift, Friedman's equation, cosmological models.
7. Merjenje kozmoloških parametrov, pospešeno širjenje vesolja, odprta vprašanja kozmologije.	7. Measurements of cosmological parameters, accelerated expansion of the Universe, open problems in cosmology.

Temeljni literatura in viri / Basic readings:

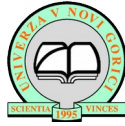
Peter Schneider, "Extragalactic Astronomy And Cosmology, An Introduction", Springer, 2006
 Ryden, Introduction to Cosmology, Addison-Wesley, 2002

Cilji in kompetence:	Objectives and competences:
- razumevanje osnovnih konceptov evolucije galaksij in njihova klasifikacija; jate galaksij in fizika AGN-jev - spoznavanje in razumevanje odprtih vprašanj v kozmologiji.	- understanding of basic concepts in galaxy evolution and classification, galaxy clusters and AGN physics - introduction to basics concepts and open questions in cosmology.

Predvideni študijski rezultati:	Intended learning outcomes:
Študenti bodo osvojili pojme in koncepte: - poznavanje osnovnih komponent in dinamike naše galaksije; okolja jat galaksij in fizika AGN-jev - poznavanje evolucije in klasifikacije galaksij; - poznavanje osnov kozmoloških modelov.	Students will learn: - main components and dynamics of our galaxy; of galaxy cluster environments and AGN physics - details of evolution and classification of galaxies; - basic of the cosmological model.

Metode poučevanja in učenja:	Learning and teaching methods:
- predavanja - računske vaje	- lectures - tutorial

Načini ocenjevanja:	Utež / Weight	Assessment:
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- domače naloge in-ali predstavitve	30	- home works and/or presentation
- ustni izpit	70	- oral exam

Reference nosilca / references of the course principal:

Doc. dr. Gabrijela Zaharijas is an assistant professor at the University of Nova Gorica.
Dr. Gabrijela Zaharijas je docentka za področje fizike na Univerzi v Novi Gorici.

She works within two big experimental collaborations: the Fermi LAT (a NASA/European gamma ray satellite in its seventh year of mission) and the CTA (which is a worldwide experimental collaboration set to build a full kilometer square array of ground based gamma ray telescopes). Dr. Zaharijas developed her career at several institutes, both in the US (New York University and Argonne National Lab, Chicago) and Europe (Stockholm University, Centre for Atomic Energy in Paris and International Centre of Physics in Trieste) before joining the astroparticle group of the University of Nova Gorica.

Izbrane objave /selected recent publications (for the full list see http://inspirehep.net/search?ln=en&p=a+zaharijas&of=hb&action_search=Search&sf=earliestdate&so=d):

1. Ajello et al. (with G. Zaharijas), "The Origin of the Extragalactic Gamma-Ray Background and Implications for Dark-Matter Annihilation", *Astrophysical Journal Letters*, 27, 800 (2015).
2. Petrovic et al. (with G. Zaharijas), "Millisecond pulsars and the Galactic Center gamma-ray excess: the importance of luminosity function and secondary emission", *JCAP* 1502 (2015) 02, 023.
3. Fermi-LAT collaboration (with G. Zaharijas), "The Spectrum and Morphology of the Fermi Bubbles", *Astrophysical Journal* (2014).
4. Petrovic et al. (with G. Zaharijas), "Galactic Center gamma-ray "excess" from an active past of the Galactic Centre? ", *JCAP* 1410 (2014) 10, 052.
5. Cirelli et al. (with G. Zaharijas), "Bremsstrahlung gamma rays from light Dark Matter", *JCAP* 1311 (2013) 035.