ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Εθνικόν και Καποδιστριακόν Πανεπιστήμιον Αθηνών
ΙΔΡΥΘΕΝ ΤΟ 1837

ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΤΟΜΕΑΣ
ΑΣΤΡΟΦΥΣΙΚΗΣ, ΑΣΤΡΟΝΟΜΙΑΣ ΚΑΙ ΜΗΧΑΝΙΚΗΣ

ΠΑΡΟΥΣΙΑΣΗ ΕΡΕΥΝΗΤΙΚΗΣ ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ
ΥΠΟΨΗΦΙΩΝ ΔΙΔΑΚΤΟΡΩΝ

Ακαδημαϊκού Έτους 2024-2025

Ημερομηνίες Παρουσίασης Ομιλιών:

Τετάρτη 11.6.2025, ώρα 15:00-17:00
Πέμπτη 12.6.2025, ώρα 12:00-17:00

Αίθουσα Διαλέξεων Τομέα

Ηλεκτρονικός σύνδεσμος:
Join from the meeting link:
https://uoa.webex.com/uoa/j.php?MTID=mf3de4aa9b9961544b9c0d3c861f8cd3d
Meeting number:
2781 699 5188
Password:
JvR36RNpxC3
Host key:
26033

Τετάρτη 11.6.2025

Συντονίστρια: Μαρία Πετροπούλου, Επίκουρη Καθηγήτρια

15:00-15:20 Ελένη Λαβασά
«Advancing Solar Energetic Particle data analyses and transport studies: Code Convergence, Inverse Modelling of GLEs, and High Energy Event Catalogues»
Κύριος επιβλέπων: Αθανάσιος Παπαϊωάννου, Εντεταλμένος Ερευνητής ΙΑΑΔΕΤ Εθνικού Αστεροσκοπείου Αθηνών

My fifth year work advanced Solar Energetic Particle (SEP) research along two complementary tracks.
1. Transport code & inverse modelling. The multi‑spacecraft study of Ground‑Level Enhancement 73 (28 Oct 2021) initiated last year, applying 1‑D and 2‑D inverse modelling to high energy proton and electron observations from STEREO‑A, SOHO and Solar Orbiter was finalized and showcased at ESWW2024. The analysis constrained the parallel mean free path and indicated strong lateral diffusion, while results pointed to the existence of unique solutions for >=3 observers. During cross‑validation of the two transport solvers numerical instabilities were uncovered. A subsequent convergence analysis removed hidden bugs, implemented core fixes, and validated the 1‑D solver against analytical δ‑function particle injections. Refactoring of the 2‑D solver is ongoing and will underpin forthcoming inversions of additional GLEs listed in the SPEARHEAD catalogues.
2. High‑energy event catalogues. Within the H2020 SPEARHEAD project I expanded the >100 MeV proton catalogue for SOHO‑EPHIN/ERNE with associated Type II/III radio diagnostics, and refined the Solar Orbiter HET catalogue (2020‑2023). For each event 3‑σ onset detection and velocity‑dispersion analysis was performed across multiple channels, deriving injection times and effective path lengths that benchmark a semi‑automated VDA tool. The curated datasets support comprehensive statistical studies and physics‑based 3‑D MHD+particle‑transport modelling of representative events.

15:20-15:40 Ελένη Αντωνοπούλου
«Black Hole Imaging: Flares in the Galactic center»
Κύριος Επιβλέπων: Αντώνιος Ναθαναήλ, Ερευνητής Γ', ΚΕΑΕΜ Ακαδημίας Αθηνών

General Relativistic Radiative Transfer (GRRT) is the process of tracking the trajectory of light rays as they approach the vicinity of extremely compact objects, such as supermassive black holes. We present the first results of our high performance GRRT code (Black Hole Imaging) in reproducing the observed flaring behavior in the vicinity of Sagittarius A* and seek out the optimal orbital parameters for modeling similar phenomena. In particular, we set our focus on the bright Near-Infrared flares observed by GRAVITY Collaboration et al. 2018 and investigate the impact of the hot spot angular velocity, the observer inclination, and the black hole spin in the resulting trajectory. Next, we shift our attention to Magnetically Arrested Disk models (MADs), that are among the most suitable candidates for describing the gas accretion and observed emission around supermassive black holes. We employ a MAD accretion disk with a distinct counter-clockwise rotation to investigate the evolution of magnetized flux tubes generated during a prominent flux eruption event. Specifically, we model the motion of hot spots, formed on the disk's equatorial plane due to magnetic reconnection, as they travel along these flux tubes at a fraction of the speed of light. Our findings
impose strict constraints on disk dynamics, revealing that hot spots with a relativistic ejection velocity are able to balance out the counter-clockwise dragging of the accretion disk and demonstrate a clockwise motion in the sky that is in good agreement with the observed flares in the Galactic center. Furthermore, our study imposes constraints on the inclination of Sagittarius A*, which should lie on the face-on range between [0, 34] and [163, 180] degrees, in accordance with the results of

E.H.T.C. et al. 2022. In conclusion, this work emphasizes the role of MAD configurations in modeling gas accretion near SgrA* and provides a direct correlation between the quasi-periodic flux eruption events, characteristic of MAD simulations, and the episodic flaring activity in the Galactic center.

15:40-16:00 Χάρης Τζερεφός
«Modified gravity: Applications in Cosmoloty, black holes and gravitational waves»
Κύριος επιβλέπων: Εμμ. Σαριδάκης, Ερευνητής Α’ ΙΑΑΔΕΤ Εθνικού Αστεροσκοπείου Αθηνών

"A brief panorama of the main results of my PhD thesis will be presented. The overarching theme of this research is using (secondary) stochastic gravitational waves to probe the early universe, particularly with regards to primordial black hole scenarios, and the gravitational law. "

16:00-16:20 Εμμανουήλ Καψαμπέλης
«Γενικευμένα κοσμολογικά μοντέλα σε χώρο Finsler-Randers»
Κύριος επιβλέπων: Εμμ. Σαριδάκης, Ερευνητής Α’ ΙΑΑΔΕΤ Εθνικού Αστεροσκοπείου Αθηνών

Στην παρουσίαση θα εξετάσουμε ορισμένα θεμελίωδη μοντέλα της κοσμολογίας και θα δούμε πως μπορούν να επεκταθούν σε χώρους Finsler-Randers. Αρχικά θα επικεντρωθούμε στην γενίκευση του μοντέλου FRW με την κατασκευή των εξισώσεων Friedmann, της εξίσωσης συνέχειας και της καταστατικής εξίσωσης. Στην συνέχεια θα δούμε ορισμένες εφαρμογές του γενικευμένου μοντέλου SFR (Schwarzschild-Finsler-Randers) στην κατασκευή αναλλοίωτων ποσοτήτων (Kretschmann) και στις εξισώσεις Raychaudhuri. Τέλος θα εξετάσουμε μία γενίκευση του μοντέλου Reissner-Nordström και του μοντέλου Kerr.

16:20-16:40 Μυρτώ Κωλλέτη
«Analysis of a coronal hole jet in the chromosphere and transition region with IRIS data»
Κύριος επιβλέπων: Κωνσταντίνος Γοντικάκης, Διευθυντής Ερευνών ΚΕΑΕΜ, Ακαδημίας Αθηνών

Solar jets are transient, dynamic features that may contribute significantly to the transport of mass and energy from the lower to the upper solar atmosphere. In this study, we analyze a small-scale jet event observed in an on-disk coronal hole in October 2013, using coordinated observations from the Interface Region Imaging Spectrograph (IRIS) and the Solar Dynamics Observatory (SDO). The jet is preceded by a mini-filament eruption occurring approximately two minutes before its onset.
Mg II k line profiles within the jet spire exhibit pronounced double peaks with deeper central reversals and large peak separations, indicative of complex chromospheric dynamics. A positive correlation is found between the peak separation and the depth of the central reversal suggesting plasma acceleration. Correlation between these parameters and Si IV doppler velocities reveal a connection between chromospheric and transition region dynamics. Additionally, Mg II k spectra reveal a bright, lower-temperature structure exhibiting significant downward motions, which is faintly visible in the AIA 304Å channel. This structure could possibly be an indicator of magnetic reconnection. These findings offer new insights into the multi-layer dynamics of solar jets and the mechanisms of jet formation and the coupling between chromospheric and transition region plasma.

16:40-17:00 Σοφία Παλαφούτα
«Διερεύνηση διαδικασιών αστρικών συγχωνεύσεων σε εξελιγμένους αστρικούς πληθυσμούς / Investigatingstellarpopulationsasaprobeforstellarmergingprocesses»
Κύριος επιβλέπων: Κοσμάς Γαζέας, Λέκτορας

Many stars are created in binary configuration, while the majority of themare led towards a merging event in their last state of evolution, that appears as a red nova. The current research focuses on W UMa-type eclipsing stellar systems with extremely low mass ratio values (q<0.15) with the aim of constructing a list of red nova progenitor candidates and predicting the time of eruption, according to Darwin's instability model.These merging events are quite rare to observe, especially for low mass stellar systems. An accurate determination of their physical and orbital parameters is crucial for the prediction of their instability mass ratio values and eventually the compilation of an extended list of stellar merger candidates.The results are expected to provide insights into how such systems are led towards their final state of evolution and what their characteristics are.

Πέμπτη 12.6.2025

Συντονιστής: Καθηγητής Ι. Δαγκλής

12:00-12:20 Alessio Liberatori
«Unveiling Carbon Stars Properties in the Milky Way and the Magellanic Clouds»
Κύρια επιβλέπουσα: Δέσποινα Χατζηδημητρίου, Καθηγήτρια

In recent decades, numerous studies have used spectral energy distribution (SED) fitting with multi-band photometry in optical and IR bands to determine the properties of carbon-rich Asymptotic Giant Branch (AGB) stars. These stars are key contributors to the chemical evolution of galaxies, enriching the interstellar medium with molecules and dust through stellar winds. They also appear to play a role in extragalactic distance estimation, particularly through the J-AGB method. Past studies have estimated mass-loss rates, dust properties, luminosities, and effective temperatures for these stars, focusing predominantly on the Magellanic Clouds (MCs). Studying carbon stars in the Galaxy is challenging due to the need for accurate distances and reddening values, which can significantly affect the derivation of the properties of this class of stars. Recently, the \textit{Gaia} collaboration published the Gaia Golden Sample of Carbon Stars (GGSCS), consisting of 15,740 carbon star candidates in both the Milky Way (MW) and the MCs, offering new opportunities for detailed analysis.
In this work, we provide a homogeneous and internally consistent analysis of stellar and dust properties for the GGSCS. Thanks to the advent of \textit{Gaia}, we are able to determine distances and reddening values for this sample of stars with sufficiently high accuracy. We compare photometric data obtained from optical and infrared missions, i.e. SDSS, \textit{Gaia}, WISE, and others with a wide grid of synthetic SED models, created using DUSTY combined with the COMARCS models. Through this analysis, we have accurately determined key parameters for these stars, including effective temperature, mass-loss rates, and additional physical properties. This work represents the first extensive and homogeneous study of carbon star properties spanning both the MW and the MCs, providing a comprehensive view of their stellar and dust characteristics.

12:20-12:40 Χάρης Τσάκωνας
«A major merger model (1:4) for Andromeda's galaxy (M31) recent accretion event and direct comparison with chemodynamical observations»
Κύρια επιβλέπουσα: Δέσποινα Χατζηδημητρίου, Καθηγήτρια

Significant observational data suggests a gas-rich major merger in the recent past (~2–3 Gyr ago) of our neighbouring Andromeda galaxy (M31). The unusually high velocity dispersion of old stars in the disc, a burst of star formation ~2–3 Gyr ago, and conspicuous substructures like the Giant Stellar Stream (GSS) in its stellar halo, point to such a merger event. We utilize an N-body hydrodynamical simulation of a major merger (mass ratio of 1:4), which reproduces the main observational features of M31, to study the nature of the substructures in its halo (GSS, NE-, and W-Shelves) and compare the model-estimated predictions with recent chemodynamical observations. DESI observations in M31's inner halo revealed coherent (wedge, chevron, and stream-like) features in the phase space of stars within its major halo substructures, along with a large sample of spectroscopic [Fe/H] measurements for resolved stars. Our model succeeds in reproducing the observed metallicity values of the various substructures of M31. This then allows us to interpret some (still unexplained) observational traits of the galaxy, i.e., the multiple peaks and the corresponding gradient in the metallicity of stars within the GSS, as well as the various features in the phase space of its major stellar substructures. Leveraging the chemodynamical properties of M31's outskirts, we conclude that the GSS appears to be a superposition of multiple loops along the line-of-sight, responsible for the apparent coherent regions in the phase space of its stars. These discrete loops are shaped by consecutive pericentric passages of the satellite over the course of the major merger.

12:40-13:00 Κωνσταντίνος Αντωνιάδης
Κύρια επιβλέπουσα: Δέσποινα Χατζηδημητρίου, Καθηγήτρια

13:00 -13:20 Κωνσταντίνα Θανασούλα
«Study of the radial diffusion mechanism effect on the trapped populations of the inner magnetosphere»
Κύριος επιβλέπων: Ιωάννης Δαγκλής, Καθηγητής

The Van Allen radiation belts are two toroidal-shaped regions of charged particles, primarily electrons and protons that are trapped by the Earth’s magnetic field. In the outer belt, radial diffusion plays a fundamental role in both the acceleration and the losses of these particles. This process results from the violation of the third adiabatic invariant due to wave-particle interactions, particularly with Ultra Low Frequency (ULF) waves in the Pc4–Pc5 range.

Our primary objective is to extend the existing “SafeSpace” database, which is based on THEMIS mission data, by incorporating Power Spectral Density (PSD) and radial diffusion coefficient (D_{LL}) values from additional space missions. Using data from a single mission often leads either to underestimation or overestimation of DLL due to limited spatial and time coverage. By integrating multi-mission data, we aim to produce a more comprehensive dataset.

As a first step, we compared magnetic field data from the Van Allen Probes (formerly known as the Radiation Belt Storm Probes, RBSP) and the THEMIS missions to assess the consistency of their measurements. These data are originally provided in the Geocentric Solar Magnetospheric (GSM) coordinate system. Our results show a good correlation in the magnetic field measurements, suggesting that no additional calibration between the two datasets is required.

We calculated the radial diffusion coefficients using the formalism proposed by Fei et al. (2006), which includes the wave power spectral density in the expressions for both the electric and magnetic components. For this purpose, we used magnetic and electric field data from the RBSP mission, originally provided in GSM coordinates, and transformed them into the local Mean Field-Aligned (MFA) coordinate system for the calculation of PSD and D_{LL}. The data were subsequently processed to identify and flag artificial spatial gradients.

13:20 -13:40 Κωνσταντίνος Παπαδημητρίου
«Using causal inference methods to study the acceleration of electron populations in the Earth's outer radiation belt»
Κύριος επιβλέπων: Γεώργιος Μπαλάσης, Διευθυντής Ερευνών ΙΑΑΔΕΤ Εθνικού Αστεροσκοπείου Αθηνών

Currently, there is no clear understanding of the comprehensive set of parameters that controls fluxes of relativistic electrons within the terrestrial magnetosphere. Herein, the methodology based on causal inference is applied for identification of factors that control fluxes of relativistic electrons in the outer belt. The patterns of interactions between the solar wind, geomagnetic activity and belt electrons have been investigated. We found a significant information transfer from solar wind, geomagnetic activity and fluxes of very low energy electrons (54 keV), into fluxes of relativistic (470 keV) and ultra-relativistic (2.23 MeV) electrons. We present evidence of a direct causal relationship from relativistic into ultra-relativistic electrons, which points to a local acceleration mechanism for electrons energization. It is demonstrated that the observed transfer of information from low energy electrons at 54 keV into energetic electrons at 470 keV is due to the presence of common external drivers such as substorm activity.

13:40-14:00
Σιγιάβα Αμιναλραγια-Γιαμινί
«Προηγμένη μοντελοποίηση και ανάλυση υψηλοενεργειακών πληθυσμών διαστημικού πλάσματος»
Κύριος επιβλέπων: Ιωάννης Δαγκλής, Καθηγητής

Θα παρουσιαστεί πρόοδος που αφορά δύο θεματικές σχετικά με Επεισόδια Ηλιακών Ενεργητικών Σωματιδίων – Solar Energetic Particle Events (SEPs), και Κοσμικών Ακτίνων – Galactic Cosmic Rays (GCRs).
A) Ανάλυση και μελέτη διαφορικών ροών ηλιακών και κοσμικών πρωτονίων από την αποστολή INTEGRAL. Η επιστημονική αποστολή INTEGRAL περιλαμβάνει στο φορτίο τη το μόνιτορ ακτινοβολίας Standard Radiation Environment Monitor (SREM) της ESA. Το SREM έχει καταγράψει πολλαπλά SEPs στη διάρκεια των αποστολής ενώ επίσης καταγράφει το υπόβαθρο κοσμικών ακτίνων. Η αποσυνέλιξη των μετρήσεων (count-rates) για τον υπολογισμό ροών πρωτονίων υψηλής ποιότητας γίνεται με μια προηγμένη μέθοδο τεχνητής νοημοσύνης. Θα παρουσιαστεί το νέο σετ δεδομένων που ολοκληρώθηκε καθώς και συγκρίσεις με πρωτονιακές ροές από άλλες αποστολές.
B) Το μοντέλο σωματιδιακής ακτινοβολίας SAPPHIRE είναι μοντέλο της ESA το οποίο χρησιμοποιείται στον σχεδιασμό διαστημικών αποστολών και την εκτίμηση της θωράκισης δορυφόρων, διατάξεων και οργάνων. Θα παρουσιαστεί η ολοκλήρωση της επέκτασης του μοντέλου, ονόματι SAPPHIRE-2S,για την παραγωγή χρονοσειρών πρωτονίων και βαρύτερων ιόντων σε επεισόδια SEP.

14:00-15:00 Διάλειμμα

Συντονιστής: Γεώργιος Βασιλόπουλος, Επίκουρος Καθηγητής

15:00 -15:20
Αργύριος Λουλές
«Modeling of resistive relativistic astrophysical outflows»
Κύριος επιβλέπων: Καθηγητής Νεκτάριος Βλαχάκης

Relativistic plasma jets are a ubiquitous feature of high-energy astrophysical processes observed across a vast range of spatial and energetic scales, from X-ray binaries containing stellar mass compact objects and active galaxies harboring supermassive black holes, to cataclysmic events, such as gamma-ray bursts. Over the years, a large number of analytical and numerical works has been devoted to understanding the intricacies of their dynamics, owing to the complexity which characterizes them, with most of these past studies performed in the ideal MHD regime. We propose a self-similar formalism, based on the expansion of the equations of relativistic magnetohydrodynamics in the vicinity of the polar axis, for the description of these outflows in the context of general relativity and present semi-analytical solutions describing strongly relativistic jets in both the ideal and resistive MHD regimes. Our solutions provide a clear picture of the acceleration and collimation mechanisms which determine the kinetic and morphological characteristics of these relativistic outflows. The resistive MHD solutions are compared to their ideal MHD counterparts, revealing the key differences between the two regimes and unveiling the impact of electromagnetic dissipation on the dynamical and energetic properties of relativistic jets.

15:20-15:40
Σταμάτιος-Ηλίας Σταθόπουλος
"Multi-Messenger Signatures of Magnetically Powered Blazar Jets"
Κύρια επιβλέπουσα: Μαρία Πετροπούλου, Επίκουρη Καθηγήτρια

Blazars, a subclass of active galactic nuclei, are characterized by relativistic jets that are closely aligned with our line of sight. This results in relativistic beaming, making blazars among the most luminous extragalactic sources across the electromagnetic spectrum, from radio waves to gamma rays and, potentially, in high-energy neutrinos. As the jets propagate outward, the magnetic reconnection process can convert this electromagnetic energy into kinetic energy of particles. This process accelerates particles to high energies. Building upon the reconnection-powered lepto-hadronic scenario proposed by Petropoulou et al. (2023), we have developed a distance-dependent radiative framework that couples ideal magnetohydrodynamic jet acceleration with localized magnetic reconnection sites. This model self-consistently tracks the evolution of jet properties, including the bulk Lorentz factor, magnetization, jet geometry, and the properties of non-thermal particles, from the jet base to parsec scales. Additionally, it accounts for the spatially varying external photon fields originating from the accretion disk and the broad-line region. We compare our model predictions with observations from Blazars

15:40-16:00
Ευαγγελία Χριστοδούλου
«Comprehensive analysis of dusty red supergiantsin NGC 6822, IC 10, and WLM»
Κύρια επιβλέπουσα: Άλκηστη Μπονάνου, Ερευνήτρια Α’ ΙΑΑΔΕΤ Εθνικού Αστεροσκοπείου Αθηνών

Mass loss shapes the fate of massive stars, however the physical mechanism causing it remains uncertain. We present a comprehensiveanalysis of 7 red supergiants in 3 low metallicity galaxies: NGC 6822, IC 10 and WLM, and search for evidence of episodic massloss. We derived the physical properties of 5 of them using the marcs atmospheric models corrected for non-local thermal equilibrium effects to measure stellar properties from our new near-infrared spectra, such as the effectivetemperature, surface gravity, metallicity and microturbulent velocity. We constructed optical and infrared light curves, discovering 2 targets inNGC 6822 with photometric variability between 1 and 2.5 mag in amplitude in r and ∼ 0.5 mag in the mid-infrared. Furthermore,we discovered a candidate dimming event in one of these sources. Periods for 3 red supergiants were determined using epoch photometry. Our comprehensive analysisof all the available data for each target provides evidence for episodic mass loss in 4 red supergiants.

16:00-16:20
Ευγενία Κουτσουμπού
«Cosmic Ray Feedback on AGN and Starburst Galaxies»
Κύρια επιβλέπουσα: Καλλιόπη Δασύρα, Επίκουρη Καθηγήτρια

Cosmic Rays (CRs) in active galactic nuclei (AGN) are a potential source of feedback able to regulate star formation. These non-thermal particles, accelerated by shocks, penetrate deep into the molecular gas, driving the heating and chemistry of the interstellar medium (ISM), and launching massive outflows. We examine the impact of CR feedback on ionized gas in a sample of nearby AGN and starburst galaxies. Using Cloudy photoionization models, we investigate CR effects on nebular gas, focusing on densities ($1–10^4$ cm^{-3}), ionization parameters ($-3.5 \leq \log U \leq -1.5$), and CR ionization rates ($10^{-16}–10^{-12}$ s^{-1}). Our results, compared with VLT/MUSE observations of Centaurus A, NGC 1068, NGC 5728, and NGC 253, reveal that high CR rates ($\gtrsim 10^{-13}$ s^{-1}) can alter the thermal structure of ionized gas. Our study unveils that high CR rates, as those expected in AGN and strong starbursts, can induce a secondary ionization layer beyond the photoionization-dominated regions, enhancing the emission of low-excitation transitions such as [N II]λ6584Å, [S II]λλ6716,6731Å, and [O I]λ6300Å. AGN models with CRs reproduce the Seyfert locus in BPT diagrams without super-solar metallicities, contrasting pure photoionization models, whereas star-forming models can explain non-AGN sources in the LINER region. Subsequently, we suggest new maximum BPT limits to differentiate regions dominated by AGN from star forming areas also impacted by high CR rates. Furthermore, we extended this study to mid-infrared (MIR) data of NGC 5728 from the *James Webb Space Telescope (JWST).* This further analysis reaffirms the role of CRs in heating the inner parts of the clouds and enhancing the emission of low-ionization lines, such as [Ar II] and [Ne II] within the Mid-Infrared Instrument (MIRI) field of view. Overall, our findings illuminate how AGN and supernova-produced CRs shape ISM in the local universe.

16:20-16:40
Δέσποινα Καράβολα
«Photo-hadronic neutrino production in magnetospheric current sheets of accreting black holes»
Κύρια επιβλέπουσα: Μαρία Πετροπούλου, Επίκουρη Καθηγήτρια

Non-jetted AGN exhibit hard X-ray emission with a power law spectrum above ~2keV, which is thought to be produced through Comptonization of soft photons by electrons and positrons (pairs) in the vicinity of the black hole. The origin and composition of this plasma source, known as the corona, is a matter open for debate. Our study focuses on the role of relativistic protons accelerated in black-hole magnetospheric current sheets in the pair enrichment and neutrino production of AGN coronae. We present a model that has two free parameters, namely the proton plasma magnetization σ_p, which controls the peak energy of the neutrino spectrum, and the Eddington ratio λ_{Edd} (defined as the ratio between X-ray luminosity L_X and Eddington luminosity L_{Edd}), which controls the amount of energy transferred to secondary particles. Our results indicate a strong dependence of the neutrino luminosity produced on the Eddington ratio. More specifically, the fraction of the X-ray energy transferred to the high-energy neutrinos produced in the coronal environment is proportional to the Eddington ratio for $\lambda_{\rm Edd} \leq 10^{-2}(\sigma_p/10^5)^{-1}$ while constant otherwise. Furthermore, we discuss our results in light of the recent IceCube observations of TeV neutrinos from NGC 1068, NGC 4151 and CGCG 420-015. We, also, combine our coronal model with the BAT AGN catalog in order to provide an estimation of the diffuse neutrino flux measured on Earth.

16:40-17:00

Γεωργία Μουτσιανά

«Comparative study of acceleration processes in the magnetospheres of Earth and Jupiter»

Κύριος επιβλέπων: Ιωάννης Δαγκλής, Καθηγητής

This study performs a comprehensive investigation of Jupiter’s multispecies plasma that fill itsextensive and dynamic magnetosphere. In particular, we analyze energetic ion data from Juno’sJupiter Energetic particle Detector Instrument (JEDI). Specifically, we use measurements from theJEDI-090 and JEDI-270 identical instruments, which provide measurements for the energy, angular,and compositional distributions of hydrogen (∼50 keV to ∼1 MeV), oxygen (∼170 keV to ∼2 MeV)and sulfur (∼170 keV to ∼4MeV) ions. In this survey, we present comprehensive ion maps derivedfrom the entire Juno prime mission (orbits 1 to 34) and spanning all available energy channels,when the spacecraft explored the dawn to pre-midnight sector of Jupiter's magnetosphere. Thesemaps reveal the spatial and energetic distributions of hydrogen, oxygen, and sulfur ions, providinginsights into the global magnetodisk structure, and ion distributions in both equatorial and offequatorialregions. As part of our ongoing work, we also assess the spectral indices to characterize the energization processes ofthese ion populations. With this work, we aspire to highlight Juno’s transformative contribution toadvancing our understanding of Jupiter’s magnetosphere and its broader implications forcomparative planetary studies.