



**Research Center for Astronomy
and Applied Mathematics**
of the Academy of Athens

ANNUAL REPORT 2025



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of the Academy of Athens

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Staff Members in 2025

The RCAAM during the year 2025 continued its multiple activities with notable scientific results published in internationally renowned journals, with international collaborations, missions to institutions abroad, and weekly seminars with speakers from Greece and abroad. This issue of the proceedings records all the activities of the members of RCAAM during the year.

The composition of the personnel in 2025 was:

- **Contopoulos George**, Academician, Supervisor of the Center, Tel.: (+30) 210 6597601, Email: gcontop@academyofathens.gr
- **Patsis Panos**, Researcher A, Acting Director. Tel.: (+30) 210 6597169, Email: patsis@academyofathens.gr
- **Contopoulos Ioannis**, Researcher A. Tel.: (+30) 210 6597167, Email: icontop@academyofathens.gr
- **Basilakos Spiros**, Researcher A. Tel.: (+30) 210 6597248, Email: svasil@academyofathens.gr (Since September 2018 also Director of the Institute of Astronomy, Astrophysics, Space Applications, and Remote Sensing of the National Observatory of Athens. Since June 2025 Director of the Board of the National Observatory of Athens.)
- **Georgoulis Manolis**, Researcher A (on leave). Tel.: (+30) 210 6597103, Email: manolis.georgoulis@academyofathens.gr
- **Gontikakis Konstantinos**, Researcher A. Tel.: (+30) 210 6597246, Email: cgontik@academyofathens.gr
- **Harsoula Mirella**, Researcher A. Tel.: (+30) 210 6597158, Email: mharsoul@academyofathens.gr
- **Tsokaros Antonios**, Researcher B (on leave). Tel.: (+30) 210 6597, Email: atsokaros@academyofathens.gr
- **Katsanikas Matthaios**, Researcher B. Tel.: (+30) 210 6597139, Email: mkatsan@academyofathens.gr
- **Nathanail Antonios**, Researcher C. Tel.: (+30) 210 6597513, Email: anathanail@academyofathens.gr
- **Tzemos Athanasios**, Researcher C. Tel.: (+30) 210 6597507, Email: atzemos@academyofathens.gr

- **Scientific Collaborators, former researchers of RCAAM:** Dara Eleni, Efthymiopoulos Christos (University of Padova, Italy), Zachariadis Theodosios, Tritakis Vasilis
- **Scientific Collaborators, Visiting Researchers:**
 - P. Patsis:** Papadopoulos Pantelis (AUTH, visiting researcher), Okalidis Periklis (contract researcher in a research program).
 - I. Contopoulos:** Chaniadakis Evangelos (contract researcher in a research program).
 - M. Katsanikas:** Bakos Konstantinos (contract researcher in a research program).
 - A. Nathanail:** Batziou Eirini (contract researcher in a research program).
- **Technical Manager:** Zoulas Manolis (on leave)
- **PhD Candidates conducting their thesis at RCAAM:** Dimitropoulos Ioannis, Univ. of Patras (supervised by I. Contopoulos), Koleti Myrto, NKUA (supervised by K. Gontikakis), Antonopoulou Eleni, NKUA (supervised by A. Nathanail)
- **Master's Students conducting their Master's thesis at RCAAM:** Michailidis Aggelos, NKUA (supervised by K. Gontikakis), Zantias Foivos, Univ. of Amsterdam (supervised by A.C. Tzemos)
- **Undergraduate Students who conducted their thesis at RCAAM:** Karyofyllis Xenophon, NKUA (supervised by A.C. Tzemos).

- **Collaborations of the Center with other research institutions:**¹

RCAAM collaborates with researchers at the following institutions:

Goddard Space Flight Center / NASA, Institut de Radioastronomie Millimétrique (IRAM), Granada, Universitat de València, Astronomical Observatory of Capodimonte (INAF), University of Michigan, NKUA, NTUA, University of Ioannina, Max-Planck-Institut fuer Astrophysik (MPA), Munich, Germany (program “1”), European Southern Observatory (ESO) (program “1”), Max-Planck-Institut fuer Extraterrestrische Physik (MPE), Munich, Germany (program “2”), Laboratoire d’ Astrophysique de Marseille (LAM), Aix-Marseille University, Marseille, France (program “2”), Aristotle University of Thessaloniki, Greece (program “2”), Jagiellonian University, Poland (program “8”), University of Barcelona, Spain (program “10”), University of Naples, Italy (program “10”), University of Sao Paulo, Brazil (program “10”), King’s College London, United Kingdom (program “10”), Cyprus Space Exploration Organization, Cyprus (program “11”), University of Helsinki, Finland (program “12”), University of Bristol, United Kingdom (program “13”), Department of Mathematics, United States Naval Academy, USA (program “13”).

A memorandum of cooperation between RCAAM and the Department of Physics of the University of Patras is also in effect (since December 2024).

¹The numbers in parentheses refer to the serial numbers of the programs in the Center’s program list.

The research of RCAAM focused mainly on the following six scientific fields:

- Theoretical and Observational Galactic Dynamics
- Nonlinear Dynamics and Chaos
- Solar Physics
- Magnetohydrodynamics
- Cosmology
- Study of electromagnetic waves of extremely low frequency (Extremely Low Frequency, ELF) in the range 2-50 Hz

About us

The Research Center for Astronomy and Applied Mathematics (RCAAM), is one of the Research Institutes of the Academy of Athens.

The main competences of RCAAM are Galactic Dynamics and Galactic Morphology, Nonlinear Dynamics and Chaos Theory, Solar Physics, Magnetohydrodynamics, Cosmology and Gravitation.

We are working towards comparing theoretical results with observational data from ground based as well as from space observatories (VLT, Solar Dynamics Observatory, etc.). The main scientific goals for the period 2022-2025 include the study of the role of Chaos in supporting structures in N-body simulations, the Dynamics of the Milky Way and other galaxies, the investigation of Chaos in quantum systems, the study of the magnetic connectivity in the active-regions of the solar atmosphere, the investigation of particle acceleration in the pulsar magnetosphere and the time profiles of the resulting high energy radiation, the formation and evolution of Structures in Cosmology as well as the nature of dark matter and dark energy.

A number of young researchers are coming to our Institute and successfully complete their PhD and Masters Theses. The researchers of our institute participate in fourteen (14) supervising committees of PhD and MSc theses. RCAAM members participated in the teaching of the courses “Galactic and Extragalactic Astronomy”, “Dynamical Astronomy” and “Cosmology” at the Department of Physics of University of Athens.

RCAAM organizes since 1997 a seminar on a weekly basis, during the whole year, with speakers leading scientists from Greece and abroad. The talks are attended by many researchers, university professors and young scientists. RCAAM has organized in 2002 and 2007 international conferences on “Galaxies and Chaos” and on “Chaos in Astronomy” respectively. This series of conferences is planned to be continued during the next years. Another conference organized with great success by our Institute was the conference “Classical and Quantum Gravity”, Crete 2009. Members of RCAAM participated also in the organization of several more conferences in Greece and abroad. Many other talks for the broad public are given every year by the researchers of RCAAM.

History

The Research Center for Astronomy and Applied Mathematics was established in 1959 initially as “Office for Research and Calculations”, to promote scientific research in Astronomy and Applied Mathematics and to perform calculations related to these topics. In 1966 has been renamed “Research Center for Astronomy and Applied Mathematics”. Since then scientific research has been conducted in the following fields, which are also the current working areas:

- Dynamical Astronomy, Nonlinear phenomena and applications of Chaos Theory in Astronomy
- Galactic Dynamics and Galactic Morphology
- Solar Physics and Relations between Solar and Terrestrial Phenomena
- Magnetohydrodynamics
- Cosmology and Gravitation
- A recently added research field is the study of electromagnetic waves of extremely low frequency (ELF) at 2-50 Hz.

The first supervisor of the “Office for Research and Calculations”, and later of the “Research Center for Astronomy and Applied Mathematics”, was Academician Prof. I. Xanthakis, until his death on 10 July 1994. During the years 1994-1997 the Research Center was supervised by Academician Prof. N. Artemiadis. After 1997 the supervisor is Academician Prof. G. Contopoulos.

As directors have served in the past Dr. L. Mavridis (1960-1966), Dr. K. Makris (1971-1979), Dr. K. Poulakos (1981-2001), Dr. N. Voglis (2001-2007), Dr. V. Tritakis (2007), Dr. E. Dara (2008). Since 2009 acting director of the Center is Dr. P.A. Patsis. Researchers who have worked in the past in the Research Center were Dr. I. Lyritzis, Dr. V. Petropoulos and Dr. Th. Zachariadis.

Our Research

Nonlinear & Chaotic Dynamics

The research that is carried out in Nonlinear and Chaotic Dynamics has as goal the investigation in depth of chaotic phenomena and the application of Chaos theory in solving astronomical problems as well as problems in dynamics that are encountered in other science disciplines. The term "Chaos" means that the laws of Physics allow limited predictability, despite the fact that these laws are expressed by rigorous mathematical equations. Although the Theory of Chaos was first applied in astronomical dynamical systems, today it finds applications to various phenomena of interest for everyday life (for example: earth and space weather forecasting, earthquakes, development of complex digital networks etc.).

Galactic Dynamics & Galactic Morphology

Galactic Dynamics is the tool to understand the observed Morphology of disk and elliptical galaxies. Our research combines Orbital Theory, N-body Simulations and Hydrodynamics with Observations in large telescopes. The orbital analysis of bars and spirals in 2D and 3D models has revealed the dynamical phenomena that shape the forms of elliptical galactic systems, the spirals of normal and barred-spiral galaxies, as well as the edge-on profiles of galactic disks. In the last years research in this field in our Institute has underlined the role of chaotic orbits in reinforcing the spiral structure in barred-spiral systems and in the dynamics of disk galaxies in general.

Solar Physics

The members of RCAAM working in solar physics possess significant skills and experience in the study and analysis of (1) magnetic loops in the solar corona, (2) particle acceleration processes in reconnecting magnetic configurations, (3) small-scale phenomena in the solar atmosphere, including micro-flares and jets, (4) solar magnetography and related diagnostics, (5) solar eruptions and their connections with the Earth, including eruption prediction, and (6) fundamental properties and complexity of solar magnetism. RCAAM solar physicists perform both data analysis and modeling, routinely analysing data from multiple ground- and space-based instruments and actively collaborating with fellow solar and heliospheric physicists worldwide.

RCAAM solar physicists are active members of multiple international professional organizations and routinely attend and contribute to International Conferences, Workshops, Symposia, as well as to Public Outreach activities aiming to inform and educate the general public on aspects of heliophysics. They participate and organize multiple conferences and convene sessions within wider conferences. They interact and collaborate with colleagues in Greece, Europe in general, the United States, and Asia (China, Japan).

Astrophysical Magnetohydrodynamics

We are investigating the dynamics of electrically conducting magnetized fluids in various systems of astrophysical interest. Over the years, we have developed pioneering semi analytical solutions of the non-linear equations of Magnetohydrodynamics (MHD) in non-relativistic protostellar winds, relativistic galactic and extragalactic jets, magnetized protostellar collapse, the axisymmetric pulsar magnetosphere, and the magnetosphere of rotating black holes. More recently, we have been working on a particular regime of MHD, namely Force-Free Electrodynamics (FFE), and developed a numerical code that we implement in the study of the structure and high energy radiation of the three dimensional pulsar magnetosphere and the solar corona. We are investigating accretion disk magnetic winds as the origin of Warm Absorbers (WA) and Ultra Fast Outflows (UFO) in Active Galactic Nuclei (AGN). We are also actively investigating the role of a novel astrophysical mechanism, the Cosmic Battery, in the origin of astrophysical magnetic fields and in the dynamics of X-ray binaries and astrophysical jets.

Cosmology & Gravitation

In the field of Cosmology, research ranges from observational to fully theoretical aspects of Cosmological physics. In particular RCAAM is interested in: (a) statistical properties of the large scale structures as well as the geometry and topology of the distribution of matter in the Universe, (b) constraints on the cosmological parameters from cosmological data, (c) evolution of perturbations and structure formation in different cosmological models, (d) the nature of dark energy and the possible interaction between dark matter and dark energy, (e) alternative theories (except dark energy) for the accelerated expansion of the universe, and (f) classical and quantum cosmology of scalar fields.

In the field of Gravitation, research is pursued in the following thematic areas: (a) classical problems in General Relativity, (b) alternative theories of gravity, (c) black hole physics and in particular on the computation of Hawking radiation, black hole entropy and the possible solutions of the Black Hole Information Paradox, (d) quantum fields in curved spacetime, and (e) quantum gravity phenomenology.

Scientific Projects

The research scientific staff of RCAAM participated in the following research programs in 2025:

1. **“Nonlinear phenomena in galactic disks”** (2024-2025). Program of the Research Committee of the Academy of Athens (200/1022). (G. Contopoulos, P. Patsis, M. Harsoula, M. Katsanikas and A. C. Tzemos and P. Okalidis). External collaborators T. Naab (Max-Planck Institut für Astrophysik, MPA, Germany) and P. Grosbøl (European Southern Observatory, ESO). Total budget: 19270€. Scientific Coordinator: G. Contopoulos.

Results:

- Publications in peer-reviewed journals: **“5”**, **“27”**.
- Publications in peer-reviewed conference proceedings: **“1”**.
- Participation in conferences and talks: **“PP-1”**, **“PP-2”** and **“PP-3”**.
- Missions-Visits to other research institutions: **“1”**.
- The MPA institute provides unlimited time for carrying out calculations within the framework of the program.

2. **“Gas flow and star formation in galactic bars”**(7/2024-12/2025). Program of the Research Committee of the Academy of Athens (200/1025) (G. Contopoulos, P. Patsis (KEAEM), E. Athanassoula Laboratoire d’Astrophysique de Marseille (LAM), of Aix-Marseille University, Marseille, France, S. Pastras, Max-Planck-Institut for

Extraterrestrial Physics (MPE), Munich, Germany, P. Papadopoulos, Aristotle University of Thessaloniki, I. Alikakos, contract researcher, P. Okalidis, contract researcher). Total budget: 18060€. Scientific Coordinator: P. Patsis.

Results:

- Publications in peer-reviewed journals: **“6”**.
- Participation in conferences and talks: **“4”**, **“5”**.
- Observations of barred-spiral galaxies were carried out in the optical, Telescope “Aristarchos”, Chelmos (18-19 January 2025).
- Organization of conferences and workshops: **“1”**.
- Missions-Visits to other research institutions: **“2”**, **“3”**.
- The MPA institute provides unlimited time for carrying out calculations within the framework of the program.

3. **“Study of order and chaos in quantum dynamical systems”** (2024-2025). Program of the Research Committee of the Academy of Athens (200/1026) (A. C. Tzemos, G. Contopoulos, F. Zantias). Total budget: 14140€. Scientific Coordinator: A. C. Tzemos.

Results:

- Publications in peer-reviewed journals: **“2”, “3”, “4”**.
- Participation in conferences and talks: **AT-1, AT-2, AT-3, AT-4**, and **AT-5**.

4. **“Study of current sheets and high-energy radiation from compact astrophysical objects”**

(2023-2026). (I. Dimitropoulos, I. Contopoulos). Program for the PhD thesis of I. Dimitropoulos funded by HFRI. Duration: 3 years. Total budget: 31500€.

Results:

- Publications in peer-reviewed journals: **“9”, “10”**.
- Participation in conferences and talks: **IC1, IC2, IC13, IC4**.

5. **“500,000 CPU core hours on ARIS HPC”**. Principal Investigator: K. Gourgouliatos (University of Patras). Co-Principal Investigator: I. Contopoulos.

6. **“100,000 hours of Machine Learning Node (Cuda GPU) on ARIS HPC”**. Principal Investigator: I. Contopoulos. Co-Principal Investigator: K. Gourgouliatos (University of Patras).

Results:

- Publications in peer-reviewed journals: **“9”**.
- Participation in conferences and talks: **IC-2, IC-3, IC-4**.

7. **“Support for the Operation and Development of the International Station for the Study of Schumann Electromagnetic Waves”** (2024-2025).

Program of the Research Committee of the Academy of Athens (200/1023), 19,440 Euros. Scientific Coordinator: I. Contopoulos.

Participation, supervision: V. Tritakis. Collaboration with the University of Krakow, Poland. It replaced a previous program with the same topic.

Results:

- Publications in peer-reviewed journals: **“11”, “13”**,
- Within the framework of the above program, seven (7) trips were made to the Parnon station for the maintenance of the measurement systems and the collection of observations.

8. **“Study of regions of the solar atmosphere where the solar wind is generated”** (2024-2025) (C. Gontikakis, I. Contopoulos), program of the Research Committee of the Academy of Athens with code 200/1021. Scientific Coordinator: C. Gontikakis.

Results:

- Participation in conferences and talks: **CG-1, CG-2,CG-3,CG-4**.

9. **“The nature of dark energy”** (duration 2011-2018, but publications based on research results from the program continue). Program for the study of the nature of dark energy. It is a collaboration among several universities: S. Basilakos, M. Plionis AUTH, J. Sola (Un. of Barcelona, Spain), S. Capozziello (University of Naples, Italy), A. Lima (University of Sao Paulo, Brazil) and N. Mavromatos (King College University of London, UK, NTUA). It is financially supported by the Universities of Barcelona, Naples, and São Paulo.

Results:

- Publications in peer-reviewed journals: **“14-20”**.

10. **“Cyprus Space Research and Innovation Centre (C-SpaRC)”**. International program co-funded by the European Space Agency (ESA), the European Union, and the Republic of Cyprus and supervised by the International Committee for Space Research (COSPAR). Coordinator: Dr. Georgios Danos, President of the Cyprus Space Exploration Organization, Cyprus. M. Georgoulis participates as an external expert, without funding.

11. **“Marie Curie Innovation and Training Network SWATNET: Space Weather Awareness Training Network”** (2021-2025). International program of the European Commission coordinated by the University of Helsinki (Finland), managed by the Research Committee of the Academy of Athens (200/963). Sponsor: European Union, Horizon 2020 Programme, National Science Foundation.

3.128.225€ (€486,035 for the Academy of Athens).

Principal Investigator: Dr. E. Kilpua, University of Helsinki, Finland. Scientific supervisor for the Academy of Athens, Acad. Prof. L. Christoforou. Participation from RCAAM, M. Georgoulis.

Results:

- Publications in peer-reviewed journals: **“21”, “22”, “23”, “24”, “25”, “26”**.
- Publications in peer-reviewed conference proceedings: **“2”, “3”, “4”**.

12. **“Methods of Dynamical Astronomy and Hamiltonian Chaos in Chemical Dynamics.”** (2022-). International collaboration with the Department of

Mathematics at the University of Bristol and the Department of Mathematics at the United States Naval Academy (S. Wiggins). Participation from RCAAM, M. Katsanikas. The University of Bristol funds researchers' travel for the needs of the program.

Results:

- Publications in peer-reviewed journals: **“32”, “33”**.

13. **“Artificial Intelligence and Machine Learning in Hamiltonian Dynamics”** (01/07/2024-31/12/2025). Program of the Research Committee of the Academy of Athens (code 200/1020). Budget: 18100 Euros. Scientific supervisor: M. Katsanikas.

Results:

- Publications in peer-reviewed journals: **“34”, “35”**.
- Participation in conferences and talks: **MK-1**.

14. **“Magnetohydrodynamics of Compact Objects.”** (2024-2025).

Research program of the Research Committee of the Academy of Athens (code 200/1024). Scientific Coordinator: A. Nathanail.

Results:

- Publications in peer-reviewed journals: **“8”, “36”, “37”, “38”**
- Participation in conferences and talks: **AN-1, AN-2**.

15. **“Gravitational Wave Events with Neutron Stars: from Nuclear Physics to Cosmology”** with funding from HFRI for the support of Faculty Members and Researchers” (code 200/1066) Scientific Coordinator: A. Nathanail.

Results:

- Publications in peer-reviewed journals: **“36”, “39”-“45”**
- Participation in conferences and talks: **AN-3, AN-4, AN-5**.

16. **“Open modeling pipelines to Make Extreme Astrophysical Events NICER (MEXANE)”** (01/03/2026-). Research program funded by OSCARS (“an Horizon Europe grant (GA number 101129751”) led by the five Science Clusters: ENVRI, ESCAPE, LS RI, PaNOSC,

SSHOC). Scientific Coordinator: A. Nathanail (from 01/03/2026)

Results:

- Preparatory work for hosting the program (RCAAM participation will begin in March 2026)
- Publications in peer-reviewed journals: **“10”**.

Publications in 2025

Special Editions

1. Dr. P.A. Patsis edited the publication of the detailed annual report of the Center for 2024, in a special issue.

Publications in International Journals with Referees

(Published or accepted for publication in 2025 (51 in total))

1. Contopoulos G., Tzemos A.C. and Zanias F., 2025, “Limits of the Formal Integrals of Motion”, J. Phys. A: Math. Theor. 58, 395701.
2. Contopoulos G., Tzemos A.C. and Zanias F., 2025, “Integrals and Chaos in Generalized Hénon–Heiles Hamiltonians”, Phys. Scr. 100, 045225.
3. Tzemos A.C., Contopoulos G. and Zanias F., 2025, “Bohmian Chaos and Entanglement in a Two-Qubit System”, Entropy 27, 832.
4. Tzemos A.C., Contopoulos G. and Zanias F., 2025, “Orbits in the Integrable Hénon–Heiles Systems”, Phys. Scr. 100, 055233.
5. Patsis P.A., Okalidis P., 2025, “Normal Spiral Grand-Design Morphologies in Self-Consistent N-Body Models”, Galaxies, 13, 132.
6. Pastras S., P.A. Patsis and E. Athanassoula, 2025, “Morphologies arising from the gas flow in the innermost kpc of barred galaxy models”, Astron. Astroph. (in press).
7. Contopoulos I., 2025, “Wave-like behavior in the Source–Detector Resonance”, Particles (MDPI) 8, 24.
8. Nathanail A., Mizuno Y., Contopoulos I., Fromm C.M., Cruz-Osorio A., Moriyama K. and Rezzolla L., 2025, “The impact of resistivity on the variability of black hole accretion flows”, Astron. Astrophys. 693, 56.
9. Dimitropoulos I., Chaniadakis E. and Contopoulos I., 2025, “The 3D Pulsar Magnetosphere with Machine Learning: First Results”, Astron. Astrophys. (in press).
10. Dimitropoulos I., Nathanail A., Petropoulou M., Contopoulos I. and Fromm C.M., 2025, “Flares from Plasmoids and Current Sheets around Sgr A*”, Astron. Astrophys. 696, 36.
11. Tritakis V., Contopoulos I., Mlynarczyk J., Chaniadakis E. and Kubisz J., 2025, “Evaluation of the quasi-pre-seismic Schumann Resonance signals in the Greek area during five years of observations (2020–2025)”, Atmosphere (MDPI) 16.

12. Contopoulos I. and Chaniadakis, E. 2025, “Conceptual analog to wave interference with discrete particles”, *Universe*, 11, 407.
13. Chaniadakis, E., Contopoulos, I., Tritakis, V. 2025 “Are Ionospheric Disturbances Spatiotemporally Invariant Earthquake Precursors? A Multi-Decadal 100-Station Study”, *App. Sciences*, 15, 13218.
14. Basilakos S., Lymperis A., Petronikolou M. and Saridakis E. N., 2025, “Modified cosmology through spacetime thermodynamics and generalized mass-to-horizon entropy”, *Eur. Phys. J. C* 85, 1244.
15. Basilakos S., Paliathanasis A. and Saridakis E. N., 2025, “Equivalence of $f(Q)$ cosmology with quintom-like scenario: The phantom field as effective realization of the non-trivial connection”, *Phys. Lett. B* 868, 139658.
16. Di Valentino E. et al., 2025, “The CosmoVerse White Paper: Addressing observational tensions in cosmology with systematics and fundamental physics”, *Phys. Dark Univ.* 49, 101965.
17. Basilakos S., Lymperis A., Petronikolou M. and Saridakis E. N., 2025, “Barrow holographic dark energy with varying exponent”, *Nucl. Phys. B* 1015, 116904.
18. Chávez R., Terlevich R., Terlevich E., González-Morán A. L., Fernández-Arenas D., Bresolin F., Plionis M., Basilakos S., Amorín R. and Llerena M., 2025, “Mapping the Hubble flow from $z \sim 0$ to $z \sim 7.5$ with H II Galaxies”, *Mon. Not. R. Astron. Soc.* 538, 1264.
19. Tzerefos C., Papanikolaou T., Basilakos S., Saridakis E. N. and Mavromatos N. E., 2025, “Gravitational wave signatures from reheating in axion–Chern–Simons running-vacuum cosmology”, *Phys. Rev. D* 111, 043523.
20. Alves Batista R. et al., 2025, “White paper and roadmap for quantum gravity phenomenology in the multi-messenger era”, *Class. Quantum Grav.* 42, 032001.
21. Georgoulis M.K., Li Q., Lee J., Wang H. and Raouafi N., 2025, “Hidden Activity Revealed: Photospheric Energetics and Dynamics with High-Resolution Magnetographic Data”, *Astrophys. J. Lett.* 990, L6.
22. Georgoulis M.K., 2025, “Complexity and Scientific Discovery in Solar Magnetic Activity”, in *Space Physics in the Context of Complex Systems Dynamics*, eds. G. Balasis, S. Wing and R. Donner, Elsevier (in press).
23. Paouris E., Vourlidas A., Hess P., Georgoulis M.K. and Stenborg G., 2025, “How the Average CME on 21 April 2023 Triggered the First Intense Geomagnetic Storm of Solar Cycle 25”, *Astrophys. J.* 982, 194.

24. Wen J., Ahmadzadeh A., Georgoulis M.K., Sadykov V.S. and Angryk R.A., 2025, “Outlier Detection and Removal in Multivariate Time Series for a More Robust Machine Learning-Based Solar Flare Prediction”, *Astrophys. J. Suppl. Ser.* 277, 60.
25. Ji A., Georgoulis M.K. and Aydin B., 2025, “Integration of Solar Flare and Coronal Mass Ejection Event Data”, *Data Brief* 60, 111539.
26. Lee J., Sharma R., Raouafi N., Georgoulis M.K., Li Q. and Wang H., 2025, “Solar Alfvénic Pulses and Mesoscale Solar Wind”, *Astrophys. J. Lett.* 988, L16.
27. Harsoula M. and Katsanikas M., 2025, “The Building Blocks of 3D Models of Barred Galaxies: I. The Case of Ring Galaxies”, *Astron. Astrophys.* 699, A13.
28. Tsokaros A., Bamber J., Ruiz M. and Shapiro S.L., 2025, “Masking Equation of State Effects in Binary Neutron Star Mergers”, *Phys. Rev. Lett.* 134, 121401.
29. Bamber J., Tsokaros A., Ruiz M. and Shapiro S.L., 2025, “Postmerger Multimessenger Analysis of Binary Neutron Stars: Effect of the Magnetic Field Strength and Topology”, *Phys. Rev. D* 111, 044038.
30. Cheong P.C.K., Tsokaros A., Ruiz M., Venturi F., Chan J.C.L., Yip A.K.L. and Uryū K., 2025, “General-Relativistic Resistive-Magnetohydrodynamics Simulations of Self-Consistent Magnetized Rotating Neutron Stars”, *Phys. Rev. D* 111, 063030.
31. Bamber J., Shapiro S.L., Ruiz M. and Tsokaros A., 2025, “Evolution of a Black Hole Cluster in Full General Relativity”, *Phys. Rev. D* 112, 024046.
32. Katsanikas M., Gonzalez Montoya F. and Wiggins S., 2025, “3D Generating Surfaces in a Quartic Hamiltonian System with Three Degrees of Freedom – I”, *Int. J. Bifurcation Chaos* 35, 2530002 (Feature Article).
33. Katsanikas M., Gonzalez Montoya F. and Wiggins S., 2025, “3D Generating Surfaces in a Quartic Hamiltonian System with Three Degrees of Freedom – II”, *Int. J. Bifurcation Chaos* 35, 2530003 (Feature Article).
34. Katsanikas M. and Wiggins S., 2025, “Classification of Trajectory Types Exhibiting Dynamical Matching in Caldera-Type Hamiltonian Systems”, *Dynamics* 5, 49.
35. Monzon Solano F., Katsanikas M., Agaoglou M. and Wiggins S., 2025, “Dynamical matching in an asymmetric and stretched Caldera potential energy surface”, *Int. J. Bif. Chaos* (in press).
36. Nathanail A., 2025, “Identifying Long Radio Transients with Accompanying X-Ray Emission as Disk-Jet Precessing Black Holes: The Case of ASKAP J1832–0911”, *Astron. Astrophys.* (in press), arXiv:2506.17389.

37. Boula S. and Nathanail A., 2025, “Secondary Black Hole-Induced Magnetic Reconnection in OJ 287: Implications for X-ray and Radio Emission”, *Astron. Astrophys.* 696, A96.
38. Antonopoulou E., Loules A. and Nathanail A., 2025, “Magnetically Arrested Disk Flux Eruption Events to Describe Sgr A* Flares”, *Astron. Astrophys.* 696, A10.
39. Jiang H.-X., Mizuno Y., Dihingia I.K., et al. (including Nathanail A.), 2025, “The Physical Origin and Time Lag of Multifrequency Flares from Sgr A*”, *Astrophys. J.* 990, 81.
40. Dahale R., Cho I., Moriyama K., et al. (including Nathanail A.), 2025, “Origin of the Ring Ellipticity in the Black Hole Images of M87*”, *Astron. Astrophys.* 699, A279.
41. Goddi C., Carlos D.F., Crew G.B., et al. (including Nathanail A.), 2025, “First Polarization Study of the M87 Jet and Active Galactic Nuclei at Submillimeter Wavelengths with ALMA”, *Astron. Astrophys.* 699, A265.
42. Röder J., Wielgus M., Lobanov A.P., et al. (including Nathanail A.), 2025, “A Multifrequency Study of Sub-Parsec Jets with the Event Horizon Telescope”, *Astron. Astrophys.* 695, A233.
43. Röder J., Wielgus M., Lobanov A.P., et al. (including Nathanail A.), 2025, “VizieR Online Data Catalog: VLBI Core Fluxes and Brightness Temperatures”, *VizieR Online Data Catalog*, J/other/3695/0233.
44. Event Horizon Telescope Collaboration, Akiyama K., Albentosa-Ruíz E., et al. (including Nathanail A.), 2025, “The Persistent Shadow of the Supermassive Black Hole of M87: II. Model Comparisons and Theoretical Interpretations”, *Astron. Astrophys.* 693, A265.
45. Gomez J.L., Cho I., Traianou E., et al. (including Nathanail A.), 2025, “Spatially Resolved Polarization Swings in the Supermassive Binary Black Hole Candidate OJ 287 with First Event Horizon Telescope Observations”, *Astron. Astrophys.* (in press).
46. Tritakis V., 2025, “Seismicity Precursors and Their Practical Account”, *Geosciences*, 15, 147.

Publications in conference proceedings and other publications with referees:

1. Patsis P.A., 2025, “Barred Galaxies as Complex Dynamical Systems- How Order and Chaos Shape Galactic Bars”, in: “Chaos and Complex Systems”, Proceedings of the 6th International Interdisciplinary Chaos Symposium, S.G. Stavrinos and M. Ozer (eds), Springer Nature Switzerland (in press).
2. Koya S., Patsourakos S., Georgoulis M. K. and Nindos A., 2025, “Assessment of the Near-Sun Axial Magnetic Field of the 10 March 2022 CME Observed by Solar Orbiter from Active Region Helicity Budget”, Solar Orbiter Science Nugget.
3. Sadykov V. M. et al. (including M. Georgoulis), 2025, “Operational and Exploration Requirements and Research Capabilities for SEP Environment Monitoring and Forecasting”, in: Proceedings of the 54th International Conference on Environmental Systems (ICES-25), Prague, Czech Republic (13–17 July), (in press).
4. Ji A., Patil P., Pandey C., Georgoulis M. and Aydin B., 2025, “Enhancing Explainability in Solar Energetic Particle Event Prediction: A Global Feature Mapping Approach”, in: Proceedings of SABID 2025, (in press).

Books

- Mr. M. Katsanikas participated in the writing of the book “Phase Space Structures in Reaction Dynamics: A Dynamical Systems Approach”, Wiggins S., Garcia-Garrido V. J. and Katsanikas M., World Scientific, ISBN: 978-981-98-1539-5 (2025).

Distinctions

- Mr. M. Georgoulis was elected a full member of the International Academy of Astronautics (IAA).
- Mr. M. Katsanikas had 2 distinguished publications (feature articles) in the journal International Journal of Bifurcation and Chaos.

Participation in Conferences and Talks

P. Patsis

- PP-1. Participation in the conference “31st Summer School – Conference DYNAMICAL SYSTEMS AND COMPLEXITY” held in Lamia, 9-12 July 2025, and presentation invited talk entitled “Hamiltonian dynamics and structure formation in disk galaxies” (10 July).

- PP-2. Participation in the conference “SCCS2025- 6th INTERNATIONAL INTERDISCIPLINARY CHAOS SYMPOSIUM ON CHAOS AND COMPLEX SYSTEMS” held in Istanbul, 7-11 May 2025, and presentation talk entitled “Barred Galaxies as Complex Dynamical Systems - How Order and Chaos Shape Galactic Bars” (9 May).
- PP-3. Participation in the conference “THE DYNAMIC UNIVERSE”, Kloster Seeon, Bavaria, 1-5 September 2025, and presentation invited talk entitled “About the dynamical mechanisms that shape bars and spirals in disk galaxies” (3 September).
- PP-4. Invited talk entitled “The Dynamics of Grand Design Morphologies in Disk Galaxies” at Department of Physics – Aristotle University of Thessaloniki (16 October 2025).
- PP-5. Participation in the conference “Dynamical Signatures of Bars and Spirals Through Cosmic Time”, Padova, Italy, 3-4 December 2025 and presentation invited talk entitled “Normal Spiral Grand-Design Morphologies in Self-Consistent N-Body Models” (4 December).

I. Contopoulos

- IC-1. Talk on the topic “New pulsar magnetospheres”, as part of the 17th Panhellenic Conference of the Hellenic Astronomical Society, University of Patras, Patras (30 June–2 July).
- IC-2. Talk on the topic “Review on neutron star magnetosphere physics” (online), invited talk as part of the conference “Multiwavelength emission of neutron stars: observations and modelling”, Strasbourg Observatory, Σ , France (7–9 July).
- IC-3. Talk on the topic “Pulsar Magnetospheres with PINNs”, invited talk, Max-Planck-Institut für Gravitationsphysik, Albert-Einstein-Institut, Potsdam, Germany (16 September).
- IC-4. Talk on the topic “Artificial “Intelligence”: the greatest “fraud” in the history of humanity?”, invited talk as part of the conference “Physics Enchants...”, of the Union of Greek Physicists, University of West Attica (19 December).
- IC-5. Talk on the topic “Pulsars with PINNs”, invited talk, Department of Astrophysics, Astronomy and Mechanics, University of Thessaloniki (28 November).

C. Gontikakis

- CG-1. Participation in the “II Metis Science Meeting” with oral presentation collaborator with a presentation on the topic “Search in Metis images for structures related with energetic particle events” Presentation: A. Michailidis (Naples, Italy, 27–29 January).

- CG-2. Participation in the “Conference of the Hellenic Astronomical Society” with oral presentation on the topic “Study of solar flare ribbons morphology and the action of plasmoids” (Patras, 30 June–2 July).
- CG-3. Participation in the “Conference of the Hellenic Astronomical Society” with oral presentation collaborator with a presentation on the topic “Active region solar jets using multi-instrument observations”. Presentation: A. Michailidis (Patras, 30 June–2 July).
- CG-4. Participation in the “Conference of the Hellenic Astronomical Society” with oral presentation collaborator with a presentation on the topic “Exploring the Multi-Layer Evolution of a small scale solar jet”. Presentation: M. Koleti (Patras, 30 June–2 July).

M. Harsoula

- MH-1. Participation in the “31st Summer School–Conference Dynamical Systems and Complexity” with oral presentation on the topic “Spiral galaxies: analytical and numerical spiral density waves” (Lamia, 7-15 July).
- MH-2. Participation in the “Dynamical Signatures of Bars and Spirals Through Cosmic Time” with oral presentation on the topic “Rings and spiral arms in 3D galactic models” (Padova, Italy, 3-4 December).

M. Katsanikas

- MK-1. Invited talk on the topic “A Study of Caldera-type Hamiltonian Systems Using Dividing Surfaces, Lagrangian Descriptors, and Swarm Intelligence”, invited talk, as part of the seminar series Department Applied Mathematics, Technical University Madrid (Technical University of Madrid), Madrid, Spain (24 September).

A. Nathanail

- AN-1. Invited participation in a Hackathon, Institute for Theoretical Physics, Goethe University of Frankfurt am Main (Hackathon lasting 4 days, total stay 6 days) (February).
- AN-2. Talk in the conference “Relativistic Magnetosphere Workshop 2025”, Les Houches, France (April).
- AN-3. Talk in the conference of HAS, Patras (29 June–1 July).
- AN-4. Talk in the conference “EHT Collaboration Summer Meeting”, Berlin, Germany (13–18 July).
- AN-5. Talk in the conference “Extragalactic Jets at All Scales”, Heraklion, Crete (25–29 August).

A. Tzemos

- AC-1. Participation in the international conference “XLV Dynamics Days 2025”, Thessaloniki, and presentation talk entitled “Chaotic Bohmian trajectories and the origin of Born’s rule” (23–27 June).
- AC-2. Participation in the “31st Summer School–Conference Dynamical Systems and Complexity”, Lamia, and presentation talk entitled “Bohmian chaos and the origin of Born’s rule” (7–15 July).
- AC-3. Participation in the conference “100 Years of Quantum: Perspectives on its Past, Present, and Future”, Perimeter Institute for Theoretical Physics, Toronto, Canada (20–24 October, online).
- AC-4. Participation in the conference “Maple Conference 2025”, Waterloo, Canada, and presentation talk entitled “Chaos in Interacting Oscillators: A Classical and Bohmian Perspective” (5–7 November, online).
- AC-5. Participation in the conference “When quantum field theory meets quantum information”, Universidad Carlos III de Madrid, Spain (15–17 December).
- AC-6. Invited talk at Universidad Complutense Madrid, Spain, entitled “Chaos in Bohmian Quantum Mechanics” (16 December).

Organisation of Conferences and Meetings

1. PP-1: Dr. P. Patsis was the chairman of the Scientific and Local Organizing Committee of the conference “HERA24: The Nature and the Dynamics of Structures Observed in Galactic Disks” which was held successfully from September 15–20 at the Academy of Athens. The conference was funded by the European Astronomical Society (EAS) through the “Wilhelm and Else Heraeus” foundation.
2. PP-2: Dr. P. Patsis was responsible for organizing the weekly seminars of the RCAAM at the seminar room of the Center.
3. SB-1: Dr. Basilakos was a member of the organizing committee of the international conference in Cosmology, “Tensions in Cosmology”, Corfu, September, with the participation of many prominent scientists.
4. MG-1: Dr. M. Georgoulis participated in organizing the Parker Solar Probe Science Working Group Meeting held at Johns Hopkins Applied Physics Laboratory from September 30 to October 2.
5. MG-2: Dr. M. Georgoulis participated in the Scientific Organizing Committee (SOC) of the Working Meeting “Operational and Exploration Requirements and Research Capabilities for SEP Environment Monitoring and Forecasting”, Georgia State University, Atlanta, Georgia (October 16–19).

6. CG-1: Dr. C. Gontikakis participated in organizing a seminar on “Solar Eclipses from Yesterday to Today and the Contribution of Serge Koutchmy” held in Athens, NKUA, on October 17.

Seminars

RCAAM, aiming at the continuous effort of informing both researchers and postgraduate students on contemporary research topics in the field of Astronomy-Astrophysics and nonlinear dynamical systems, organizes weekly seminars. Often, researchers from foreign institutions are funded by their institutes to come and speak at RCAAM seminars and interact with our center's researchers. In 2025, 10 seminars were held at the Center, covering topics in Astronomy, Astrophysics, and nonlinear Dynamics. In addition to the researchers and postgraduate students of the Center, the seminars also featured academics, professors, and distinguished scientists from various Universities and Research Centers from Greece and abroad.

Furthermore, in 2025, 26 seminars were held at RCAAM by students from the Physics Departments of the University of Athens and the University of Patras, focusing on high-energy Astrophysics/Magnetohydrodynamics, under the supervision of Professors I. Contopoulos and A. Nathanail.

The following is the list of seminars.

TABLE OF SEMINAR SPEAKERS 2025

Georgios Contopoulos Academy of Athens	Orbits in integrable Hénon–Heiles systems	14/01/2025
Matthaios Katsanikas KEME Academy of Athens	Phase Space Structure and Dividing Surfaces in 2D and 3D Caldera-type Hamiltonian Dynamical Systems	28/01/2025
Tasos Bountis University of Patras	Damping Effect of Caputo Fractional Time Derivatives in Nonlinear Wave Equations	04/02/2025
Panos Patsis KEME, Academy of Athens	Morphologies arising from the gas flow in the innermost kpc of barred galaxy models	04/03/2025
Angel Sanz Complutense University, Madrid	Can we learn anything new about the quantum world from Bohmian mechanics?	11/03/2025
Ioanna Psaradaki MIT Kavli Institute	Mineralogy of interstellar dust in the X-ray regime	18/03/2025
Zoe A. Le Conte Durham University	A JWST investigation into barred galaxies at high redshifts $z > 1$	08/04/2025
Ioannis Liidakis Institute of Astrophysics FORTH	Understanding supermassive black holes through multiwavelength polarization	29/05/2025
Dimosthenis Kazanas NASA Goddard Corresponding Member Academy of Athens	Gravity beyond Einstein? Yes, but in which direction?	16/09/2025
Angelos Michailidis University of Ioannina, KEME Academy of Athens	Jets and the Origin of the Solar Wind	05/11/2025

TABLE OF SPEAKERS IN THE ASTROPHYSICS/MAGNETOHYDRODYNAMICS
SEMINARS 2025

Elena Antonopoulou	Magnetic Flux Eruption Events in Sgr A*	9/1/2025
Ioannis Dimitropoulos	Comparison of Synthetic Pulsar Observations with Observations from the Fermi-LAT Catalog	16/1/2025
Myrto Koleti	Multiwavelength Study of a Jet from a Solar Coronal Hole	23/1/2025
Argyris Loules	Particle Acceleration through the Rayleigh-Taylor Instability	7/2/2025
Angelos Michailidis	Searching for Structures Related to Energetic Particle Release on the Sun	20/2/2025
Evgenia Koutsoumbou	High-Energy Cosmic Rays from Active Galactic Nucleus Outflows	27/2/2025
Ioannis Dimitropoulos	Determination of Physical Parameters of Neutron Stars Using Observations of PSR J0030+0451	7/3/2025
Elena Antonopoulou	Multiwavelength Study of Jets on Sub-Parsec Scales with the Event Horizon Telescope	14/3/2025
Kostis Gontikakis	Solar Atmosphere and Radiation	21/3/2025
Argyris Loules	Magnetized Disks and Spectral Hysteresis of XRBs	28/3/2025
Elena Antonopoulou Giannis Dimitropoulos Argyris Loules Antonis Nathanail	Presentations for the conference “Feeling the pull and the pulse of relativistic magnetospheres”	6/4/2025
Elena Antonopoulou Giannis Dimitropoulos Argyris Loules Antonis Nathanail	Impressions from the conference “Feeling the pull and the pulse of relativistic magnetospheres”	9/5/2025

TABLE OF SPEAKERS IN THE ASTROPHYSICS/MAGNETOHYDRODYNAMICS
SEMINARS 2025

Elena Antonopoulou Giannis Dimitropoulos Argyris Loules Antonis Nathanail	Impressions from the conference “Feeling the pull and the pulse of relativistic mag- netospheres”	16/5/2025
Angelos Michailidis	Revisiting the SATIRE-S Model for the Calculation of the Solar Irradiance Intensity	23/5/2025
Kostis Gontikakis	Three-Dimensional Simulations of Reconnection in Solar Flares and the Importance of Ribbons in Un- derstanding Plasmoids	30/5/2025
Elena Antonopoulou	Particle Production in Black Hole Magnetospheres	6/6/2025
Vasilis Bisketzis	New Developments in the Field of Artificial Intelligence	10/10/2025
Eirini Batziou	The Physics of Ultrarelativistic Outflows of γ -Ray Bursts	17/10/2025
Phoivos Zanias	Recovery of Primitive Variables in Ideal Relativistic Magnetohydrodynamics	24/10/2025
Argyris Loules	The Theory of Magnetohydrodynamics in Curved Spacetimes	7/11/2025
Evgenia Koutsoubou	High-Energy Cosmic Rays from Active Galactic Nu- clei	14/11/2025
Elena Antonopoulou	Observations of the M87 Jet in the Infrared with JWST	21/11/2025
Phoivos Zanias	Magnetic Flux Transport in Magnetically Arrested Disks	28/11/2025
Phoivos Zanias	Magnetic Flux Transport in Magnetically Arrested Disks	5/11/2025
Antonis Nathanail	The Physics of Magnetically Arrested Disks	12/11/2025
Eirini Batziou	Angular Momentum Transport through Magnetic Flux Eruptions in Magnetically Arrested Disks	19/12/2025

Teaching

The researchers of the RCAAM gave a series of lectures in university departments, seminars for students and researchers, and in schools organized by scientific societies.

- Dr. **S. Basilakos** taught, upon assignment, the course in Cosmology in the Departments of Mathematics and Physics at the University of Athens.
- Dr. **C. Gontikakis** participated in the teaching of the postgraduate course in Solar Physics in the Department of Physics at the University of Athens, in collaboration with Professors I. Dagklis, Dr. A. Heilaris, and Dr. Ch. Katsavrias, during the period (March-June).
- Mr. **M. Katsanikas** taught the course of Dynamical Astronomy in the postgraduate study program (MSc) in Astrophysics of the Department of Physics of the NKUA (academic year 2024-2025, spring semester). He also teaches the course of Galactic and Extragalactic Astronomy in the postgraduate study program (MSc) in Astrophysics of the Department of Physics of the NKUA (academic year 2025-2026, fall semester).

PhDs and Masters

At RCAAM, doctoral candidates and graduate students working on their theses for the acquisition of specialization diplomas (Masters), as well as senior university students preparing their bachelor's theses, are employed. Additionally, the researchers of RCAAM participate in committees overseeing dissertations and bachelor's theses, which are mainly conducted outside of RCAAM.

Specifically, in 2025, the members of RCAAM supervised the following doctoral dissertations and master's and bachelor's theses:

- Dr. **I. Contopoulos** was the main supervisor of the doctoral thesis
 - of Mr. I. Dimitropoulos entitled: “Origin of high-energy radiation from compact objects (black holes, pulsars)” (Department of Physics, University of Patras). The thesis was completed in 2025.

and a member of the three-member committee of the doctoral thesis

- of Mr. D. Dotsikas entitled: “Study of pulsar magnetospheres” (Department of Physics, University of Patras). The thesis was completed in 2025.

Dr. **I. Contopoulos** is a member of the three-member committee of the doctoral theses:

- of Mr. Ch. Sini entitled: “Relativistic Instabilities in Astrophysical Jets” (Department of Physics, NKUA, successfully completed).

- of Mr. A. Loule entitled: “Modelling of Astrophysical Accretion Disks”(Department of Physics, NKUA).
- Dr. **K. Gontikakis** is the main supervisor of the doctoral thesis
 - of Ms. M. Koletis on the subject “Study of plasma outflow regions from the solar atmosphere” (Department of Physics, NKUA).
 Co-supervisors: N. Vlahakis, Department of Physics, NKUA, S. Patsourakos, Department of Physics, University of Ioannina.

Also, he was the supervisor of the Master’s thesis

- of Mr. Angelos Michailidis on the subject “Study of the radiation and magnetic field of plasma outflow jets in the solar atmosphere”.

and supervisor of the internship

- of Ms. Evgenia Kontogianni, student at the University of Ioannina, from July 1 to September 15, 2024, on the subject “Study of coronal loops during a flare from observations in ultraviolet radiation”.

Finally, he participated in the three-member supervision committee of the Master’s thesis at NKUA of Adamantia Dimitrakoula entitled: “ Physics-based modelling of radial diffusion in the outer Van Allen belt” with Mr. I. Daglis as the main supervisor.

- Dr. **M. Charsoula** is the supervisor of the thesis of the student Theodosia Kavaliogiou at the SEMFE Department of the National Technical University of Athens with the title “The role of rotational angular velocity in the density wave theory in large spiral galaxies”.
- Dr. **M. Katsanikas** is the main supervisor of the doctoral thesis of Aikaterini Maria Vergiopoulou,

“Phase Space Geometry and Machine Learning in Dynamical Systems”, at the Department

of Applied Mathematics of the Polytechnic University of Madrid, Spain.
- Dr. **A. Nathanael** is the supervisor of the doctoral thesis
 - of Ms. E. Antonopoulou at the Department of Physics of NKUA with the title: “Exploring the hidden aspects of black holes: magnetohydrodynamic simulations and flares in regions of extreme gravitational influence”.
- Dr. **A. Tzemos** is the supervisor of the Master’s thesis

- of Mr. Foivos Zannias, postgraduate student at the Department of Physics of the University of Amsterdam, entitled: “Study of order and chaos in quantum dynamical systems”, which is part of the eponymous program of the Research Committee of the Academy of Athens (200/1026).

He was also the supervisor of the undergraduate thesis

- of Mr. X. Karyophyllis (Department of Physics NKUA), on the subject “Order and Chaos in the de Broglie-Bohm interpretation of Quantum Mechanics”.

The undergraduate thesis was completed in 2025.

Participation in Committees

The members of RCAAM are active members in many national and international scientific committees for the promotion of researchers and university professors in Greece and abroad. They serve also as referees in the main research astronomical journals.

Promotion of Astronomy and Public Outreach

The researchers of RCAAM, upon invitation, gave several outreach talks at educational institutions and events for the public. They also wrote popular science articles and contributed to the dissemination of the research results of the Center through their interventions.

• I. Contopoulos

- “Artificial Intelligence”: Progress or the greatest “bubble” in the history of humanity?”, Hesychastirion of the Transfiguration of the Savior (Saint Porphyrios) and Association of Families with Many Children of Oropos, Milesi, Oropos (February 22).
- “Black Holes”, Educational Institutions of the Holy Metropolis of Piraeus, Piraeus (February 26).
- “Man and the Universe”, Piraeus Lighthouse, Piraeus (April 1).
- “A Brief Introduction to Quantum Mechanics”, Holy Monastery of All Saints of Spetses (August 10).
- “The Fallacy of Excellence”, Parents’ School, Parish of the Dormition of the Virgin Mary, Argyroupolis (December 14).
- “Faith and Science”, 1st Gymnasium of Drapetsona (December 23).

- **M. Charsoula**

- Talk on the topic “A Tour of the Nearby and Distant Universe”. Municipality of Voula–Vari–Vouliagmeni, Town Hall premises, as part of the 5th Natural Sciences Conference – Physics Festival (February).
- Talk on the topic “A Tour of the Nearby and Distant Universe”. 3rd General Lyceum of P. Faliro, as part of the Student Meeting “Physics Enchants”, co-organized by the Hellenic Physical Society (March).
- Talk on the topic “The Secrets of the Universe”. 3rd grade of the 3rd Lyceum of Vyronas (March).
- Talk on the topic “A Tour of the Nearby and Distant Universe”. Athens College (April).
- Talk on the topic “A Tour of the Nearby and Distant Universe”. 2nd grade of the Gymnasium of the Hellenic-German Education” Schools (October).

- **V. Tritakis**

- Invited talk on the topic “An Alternative View on the Problem of Climate Change”. Society of Friends of the People (April).
- Invited talk on the topic “The Greek Economy through the Eyes of the Ordinary Everyday Person”. Glyfada Rotary Club (September).