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<td><strong>Scientific Associates</strong></td>
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<td><strong>Information Systems Administrator &amp; EPO</strong></td>
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Associate Members and Visitors

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- Giannis Kontogiannis (+30) 210 6597139  jkonto@noa.gr
- Rocío Paez (+30) 210 6597513  rocioisabelpaez@gmail.com
- Athanasios Tzemos (+30) 210 6597513  thanasistzemos@gmail.com
- Sotirios Chatzopoulos (+30) 210 6597169  mrsotiris2000@gmail.com
- Athanasios Tzemos (+30) 210 6597169  theanasistzemos@gmail.com

**PhD Students**
- Elpida Koutsantoniou (Supervisor: I. Contopoulos) (+30) 210 6597143  leelamichaels@gmail.com
- Konstantina Zouloumi (From November 2018, Supervisor: C. Efthymiopoulos) (+30) 210 6597513
- L. Chaves-Velasques (INAOE-Mexico, SEP-CONACYT program (Supervisor: P. Patsis)

**MSc Students**
- Konstantina Zouloumi (Up to October 2018, Supervisor: C. Efthymiopoulos) (+30) 210 6597513
- Evangelia Samara (Supervisor: M. Georgoulis)  evangelia.sam@gmail.com

**Collaborators**
- Evaggelos Argoudelis, Financial and legal manager of the European program FLARE-CAST (in collaboration with M. Georgoulis), Panos Kyziroopoulos (PhD student of the University of Thrace, collaboration with C. Efthymiopoulos), Mygdakos Constantinos, software manager in the framework of the A-EFFORT program of ESA (in collaboration with M. Georgoulis).
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 2018-19 include the study of the role of Chaos in supporting structures in Nbody 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

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 Unites 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 scientific stuff of RCAAM participated during 2016 in the following programs:

   Publications in journals with referees No: “1”, “4”, “6”, “7”, “8”.
   Talks, presentations: PP-1, CE-4.

2. “Dissemination of research results” Program funded from the general bequests for education of the Academy of Athens (200/901) (G. Contopoulos, A.C Tzemos). 37 seminars at the RCAAM and a special volume of RCAAM (see catalog in the paragraph “Seminars”).

   Talks: CE-2, CE-3, CE-5

   Publications in journals with referees No: "2"

5. “Study of the dynamical evolution of the entanglement and coherence in quantum systems” (G. Contopoulos, C. Efthymiopoulos, A. Tzemos) (not funded).
   Publications in journals with referees No “3”
   Talks: AT-1, AT-2


   Publication in journal with referees: No “6”.
   Talk: PP-2

8. “The thick part of galactic bars”. Program of Laboratoire d’ Astrophysique de Marseille, University Aix-Marseille (AMU), in collaboration with RCAAM (E. Athanassoula, P. Patsis), 2017-2018. The program funds the visits of researchers
at LAM.
One paper submitted for publication in journals with referees.

9. ‘Numerical investigation of the impact of Complex Instability to the phase space structure of Dynamical Systems with emphasis to barred galaxy models” (H. Skokos, University of Cape Town, S. Africa, P. Patsis, A. Bäcker, Technische Universität Dresden, Germany). 2018-2019. Program funded by the University of Cape Town, supporting the visits of H. Skokos at RCAAm. H. Skokos visited RCAAM in July 2018
One paper in preparation.

10. “Simulation of the crossing effects of dark subhalos on the tidal streams around galaxies". AMU in collaboration with RCAAM (E. Athanassoul, C. Efthymiopoulos).
One paper in preparation.

11. “N-body simulations of galactic disks – The relation between observed spiral disk morphologies a/d the dynamical properties of DM halos” (P. Patsis, A. Burkert. University of Munich, T. Naab, Max Planck Institute für Astronomie, P. Grosbol, European Southern Observatory, Munich). Program funded by the interdisciplinary program of excellence ”Excellence Cluster “ involving the Politechnical School (TU) and the University (LMU) of Munich, the institutes Max Planck for Astrophysics and extrasolar Physics in Munich and the European Southern Observatory (ESO). Computational time is provided in the Computational Center RZG, Garching, Germany, where numerical simulations with N-body models are conducted.
One paper in preparation.

Publication in journal with referees No: “48”.
Talks: CE-1

13. “Using starburst galaxies to trace the cosmic acceleration” (S. Basilakos, M. Plionis, AUT, R. Terlevich, Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE), Mexico and University of Cambridge. It is about a collaboration of RCAAM with the National Observatory of Athens, Institute INAOE of Mexico and the University of Cambridge. It is financially supported by INOAE (duration 2011-2018).
Publications in journal with referees No: “16”


15. “XMM-Newton Very Large Programme” Program of European Space Agency (ESA) with collaboration between many Universities and Institutes. Dr. Basilakos is the scientific director of the section named “AGN Cosmology” (not funded). (Duration 2010-2020).

16. “The nature of dark energy” Research Program for the study of the nature of dark energy. It is a collaboration between several Universities (S. Basilakos, M. Plionis, AUT, J. Sola (Un. of Barcelona), S. Capozziello (Un. Of Naples), A. Lima (Un. of Sao Paulo) and N. Mavromatos (King College, Un. of London). It is financially supported by the Universities of Barcelona, Naples and Sao Paulo (Duration 2011-2018).


webpage: http://www.varsiti.org

Webpage: https://sites.google.com/site/solarorbiterdawg/home
One paper in preparation.
22. “Understanding and forecasting of Solar Flares- Supplementary Action”
   Publications in journals with referees No: “33” Participations in conferences: MG-1, MG-3


25. “Construction of experimental station for the measurement of Schumman waves and preliminary measurements”. Scientific Director of research program, V. Tritakis. Program funded by Mariolopoulio Foundations and the University of Ioannina. Participant from RCAAM: I. Contopoulos. Experimental measurements also work for the construction of a permanent station are underway.
   Publications in journals with referees No: “15”

Publications in 2018

Special Editions
   RCAAM published a special volume (in Greek) with title “Advances in Astronomy 2018” (Eds., G. Contopoulos and P.A. Patsis), which includes a series of papers summarizing the recent research results of RCAAM.
   Dr. Patsis was the editor for the 1st issue of the journal of Hellenic Astronomical Society “Hipparchos”.
   Furthermore Dr. Georgoulis was editor of the special volumes:
   a) Space Weather Research Across the Full Data Lifecycle (Eds. R. M. McGranaghan, A. Anastasiadis, E. Camporeale and M. K. Georgoulis), J. Space Weather Space Climate, 2018, in press and

Publications in International Journals with Referees

(Published or accepted for publication in 2018)


31. Gontikakis C. and Vial J.-C., 2018, ” Effects of resonant scattering of the Si IV doublet near 140 nm in a solar active region”, Astron. Astroph., 619, 64


38. Tritakis V., Repapis C. and Karamanos A., 2018, ”Confirmation of an Early Estimation for an increase in the seismic activity towards the end of the twentieth century.”, J. Seismol., 22:921


Publications in conference proceedings and other publications with referees:

1. Fukumura K., Contopoulos I., Shrader C., Behar E., Kazanas D. and Tombesi F., 2018, “Variable Nature of Magnetically-Driven Ultra-Fast Outflows (UFOs) from AGN Accretion Disks”, 42nd COSPAR Scientific Assembly 14-22 July 2018, Pasadena, California, USA, E1, 4-45-18


Publications in conference proceedings and other publications without referees:


Publications in Greek

The contents of the special edition “Advances in Astronomy 2018” are:

1. G. Contopoulos and R. Paez: Order in Chaos
2. P. Patsis: Dynamics of 3-d galactic spirals
3. C. Efthymiopoulos: Tides in our solar system
4. I. Contopoulos: Physical processes around a black hole
5. S. Vasilakos and M. Pleionis: Cosmology: The science of the birth and the evolution of Universe
7. M. Georgoulis: Space weather forcasting in era of artificial intelligence: FLARECAST program and its main results
8. M. Harsoula, C. Efthymiopoulos and G. Contopoulos: Galactic model of our Galaxy with two pattern speeds
9. V. Tritakis and K. Florios: Empirical-statistical method for the prediction of earthquakes of short space-time window in the Greek territory based on electromagnetic perturbations of low frequency (ELF)
10. C. Karamanos: Characteristic recurrence times (according to Poincaré) for 1-d and 2-d maps
Distinctions

Dr. S. Basilakos was elected Director of the Institute of Astronomy, (IDAET), National Observatory of Athens (2018-2022).

Dr. M. Georgoulis was honored with the medal of the Member of the Historical 1st Gymnasium of Chios, August 22 2018. He was also selected among the top 10 judges for 2018 of the scientific journal “Advances in journal Review space”.

Participation in Conferences and Talks

G. Contopoulos


P. Patsis


PP-2. Three invited seminars at the Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE), Tonanzitla, Mexico, 27, 29 and 31/8).

C. Efthymiopoulos

CE-1. Metastability dynamics and FPU timescales: the perspective of perturbation theory Invited talk in ”FPU-2018”, Workshop, Universita degli Studi di Padova, April 2018

CE-2. Methods and Applications in Manifold Dynamics: from molecules to Space and galaxies Invited talk in ”Perspectives in Hamiltonian Dynamics” an ERC Funded Conference, Universita degli Studi di Padova, Venezia, June 2018


CE-4. Computational Hamiltonian Perturbation Theory and its Applications Invited seminar, Dept. of Mathematica, Universita degli Studi di Padova

CE-5. Applications of Invariant Manifolds in Dynamical Astronomy Invited Seminar, Astro- nomical Institute, Czech Academy of Sciences, Prague, November 2018
I. Contopoulos


IC-2. Workshop on Relativistic Astrophysics, Purdue University, West Lafayette, IN, May 6-9. Invited talk with title: “A Cosmic Battery in accretion flows around astrophysical black holes”.


IC-5. NASA/Goddard Space Flight Center, Greenbelt, MD, ΗΠΑ, May 3. Invited talk with title: “The black hole magnetosphere”.

IC-6. Department of Astronomy, University of Chicago, May 9. Invited talk with title: “A Cosmic Battery in accretion flows around astrophysical black holes”

IC-7. Institute of Physics MEPhI of Moscow, September 6. Invited talk with title: “Numerical simulations in industry”


C. Gontikakis

CG-1. Participation in the 9th conference IRIS, Gottingen, June 25-29. Talk with title: “Resonant scattering in Transition Region Si IV lines”

CG-2. Participation at the meeting Solar Orbiter MADAWG (Modeling And Data Analysis Working Group), September 26-29 2018, Athens

CG-3. Invited talk at the Physics Department of the UOC with title: “Study of the solar corona and transition region through Extreme Ultraviolet Spectroscopy”, October 25.

M. Georgoulis

MG-2. High Performance Computing (HPC) @ Sheffield, Workshop, University of Sheffield, UK. Opening talk (keynote) with title “From Physical Understanding to Forecasting of Solar Flares and Coronal Mass Ejections”, March 27.

MG-3. European Solar Telescope (EST) Science Meeting, Giardini Naxos, Italy. Invited talk with title “Pre-Eruption Conditions in Solar Active Regions: O2R and a Meaningful EST Role”, May 14 – 18


MG-5. 42nd COSPAR General Assembly, Pasadena, USA, July 14 – 22. Two talks: • Invited talk with title “Forecast Verification in the Framework of the EU FLARECAST Project”. • Non invited talk with title “Eruptive Flare Initiation and the CME Magnetic Field”.


MG-8. EarthCube RCN: Toward Integration of Heliophysics, Data, Models and Analysis Tools, New Jersey Institute of Technology (NJIT). Invited talk with title “European Efforts for Heliophysics Data Integration and Assimilation”, November 14 – 16


M. Harsoula


V. Tritakis

VT-1. Participation in the conference COMECAP, Alexandroupolis, October 15-17, 2018.

A. Tzemos


K. Zouloumi


Organisation of Conferences and Meetings

1. PP-1. Dr. Patsis was member of the scientific organizing committee of the 25th Summer School- Conference: “Dynamical systems and complexity”, NCSR Demokritos, July 9-17.


3. MG-1. Dr. Georgoulis was coorganizer of the meeting “Progress in Space Sciences Fostered by the European Commission”, 2018 EGU General Assembly, Vienna, Austria, April 8 – 13. In addition, in the conference of the 15 th European Space Weather Week (ESWW15), Leuven, Belgium, November 9 – 15 he participated in the organizing the following meetings and acts:
   - “Unveiling Current Challenges in Space Weather Forecasting”.
   - “The FLARECAST Scientific and Technological Facility: What Now?”.
   - “Flare Forecasting: Where are We, and Where Should We Be Going”?

Finally he organized two workshops with international participators:
   - Member of the scientific organizing committee, EMF & Health Workshop 2018, IIBEAA of the Academy of Athens, September 14 – 15.
**Seminars**

RCAAM, aiming at the continuous effort to inform both researchers and postgraduate students in modern research, organizes weekly seminars, funded mainly by the Academy of Athens, by decision of its Council, while some researchers of foreign institutions were funded by their institutions to come and speak in the seminars. In 2018 39 seminars took place at RCAAM, most of them about Astronomy, Astrophysics and Mechanics.

The invited speakers were, beside the researchers and students of RCAAM, Academicians, professors and distinguished scientists from various universities and research centers in Greece and abroad. Here is the complete list of the seminars.

**Table of Invited Talks 2018**
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<th>Name</th>
<th>Institution</th>
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<tr>
<td>Stamatis Nicolis</td>
<td>University of Tours</td>
<td>Deterministic chaos and information processing in quantum gravitational systems</td>
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<tr>
<td>Vasileios Drakopoulos</td>
<td>University of Thessaly</td>
<td>Complex Dynamics of several iterative methods</td>
<td>16/1/2018</td>
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<td>Christos Efthymiopoulos</td>
<td>RCAAM of the Academy of Athens</td>
<td>Manifold-driven spirals, disc-Halo interaction and the secular evolution in barred-spiral galaxies</td>
<td>23/1/2018</td>
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<tr>
<td>George Lukes-Gerakopoulos</td>
<td>Astronomical Institute CAS</td>
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<tr>
<td>Ioannis Papagiannopoulos</td>
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<td>Ioannis Kontogiannis</td>
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<tr>
<td>Rocio Paez</td>
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<td>Mirella Harsoula</td>
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<tr>
<td>Ioannis Daglis</td>
<td>University of Athens</td>
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<tr>
<td>Ioannis Kominis</td>
<td>NTUA</td>
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<td>Nikolaos Prantzzos</td>
<td>Institut d’Astrophysique de Paris</td>
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<td>Fotios Anagnostopoulos</td>
<td>University of Athens</td>
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<tr>
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<td>Institution</td>
<td>Title</td>
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<tr>
<td>Evangelia Samara</td>
<td>RCAAM of the Academy of Athens</td>
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<td>Christos Efthymiopoulos</td>
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<tr>
<td>Panos Patsis</td>
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<tr>
<td>Charalambos Sinnis</td>
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<td>Stability analysis of relativistic magnetized astrophysical jets</td>
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<tr>
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<tr>
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<tr>
<td>Panos Kyziropoulos</td>
<td>University of Thrace</td>
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<tr>
<td>Christos Efthymiopoulos</td>
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<td>Dynamical features of resonances for Earth satellite orbits</td>
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<td>Constantinos Gourgouliaios</td>
<td>University of Durham</td>
<td>Reconfinement and Loss of Stability of Active Galactic Nuclei Jets</td>
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<td>Hongqi Zhang</td>
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<td>The role of the solar magnetic fields and helicity</td>
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<td>Joan Font</td>
<td>Instituto de Astrofísica de Canarias</td>
<td>Annular kinematic segmentation of galaxy disks</td>
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| **Pierfrancesco Di Cintio**  
| IFAC-CNR Institute of Applied Physics | N-body chaos and the continuum limit in numerical simulations, revisited | 3/7/2018 |
| **George Leivadiotis**  
| Southwest Research Institute Texas, USA | Kappa Distributions: Theory and Applications in Plasmas | 17/7/2018 |
| **Ioannis Gkolias**  
| Milan Polytechnical School | Towards a sustainable exploitation of the geosynchronous orbital region | 24/7/2018 |
| **Christos Efthymiopoulos**  
| RCAAM of the Academy of Athens | Quantum decoherence and its role in quantum foundations | 10/10/2018 |
| **Athanasios Tzemos**  
| RCAAM of the Academy of Athens | The effect of entanglement on the Bohmian trajectories of a two-qubit system | 16/10/2018 |
| **Jerome Daquins**  
| University of της Πάντοβα | Some dynamical aspects of the medium earth orbits | 23/10/2018 |
| **Preben Grosbøl**  
| ESO | Spiral potential of the Milky Way | 30/10/2018 |
| **Constantinos Gontikakis**  
| RCAAM of the Academy of Athens | Importance of the radiative diffusion in the spectral line Si IV 1393Å, 1402Å for the study of the transition region | 6/11/2018 |
| **Constantinos Tziotziou**  
| NOA | A long-duration quiet-Sun small-scale vortex | 13/11/2018 |
| **Manolis Xylouris**  
| NOA | DustPedia - A Definitive Study of Dust in the Local Universe | 20/11/2018 |
| **Constantinos Karamanos**  
TEI of Athens | Poincaré Recurrence Time Theorem as a unifying element towards the understanding of coding/noncoding prediction algorithms for DNA Strands | 27/11/2018 |
| **Vasileios Tritakis**  
RCAAM of the Academy of Athens | An Experimental/Empirical/Local Law of Estimating Oncoming Seismic Activity within a bounded time-space window based on ELF electromagnetic Perturbations | 4/12/2018 |
| **Costas Florios**  
RCAAM of the Academy of Athens | Possibility of Earthquake Forecasting Within a Narrow Time-Space Window | 11/12/2018 |
| **Ioannis Contopoulos**  
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| **Constantinos Karamanos**  
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| **Ioannis Contopoulos**  
RCAAM of the Academy of Athens | High-energy radiation from a “ring of fire” in pulsars | 18/12/2018 |

**Teaching**

Researchers of RCAAM taught postgraduate courses in university departments, seminars for students and researchers, and schools organized by scientific associations.

- **Dr. Patsis** taught, under assignment, the postgraduate lesson “Galactic and Extragalactic Astronomy” of the Astronomy, Astrophysics and Mechanics Division of UoA, (in collaboration with assistant professor Dr. S. Kazantzidis).
• **Dr. Efthymiopoulos** taught, under assignment, the postgraduate lesson “Dynamical Astronomy” in the postgraduate program Astronomy-Astrophysics of the Physics Department of UoA. Moreover he made three lectures as a member of the teaching group of the postgraduate lesson “Special Topics in Dynamical Systems”, in the framework of the postgraduate lesson “Mathematical Modelling” which is coorganised by National Polytechnical University and the COSA network of NCSR Demokritos.

• **Dr. Basilakos** taught the lesson of Cosmology (winter and spring semester of 2018) in the Mathematics and Physics Departments of UOA. During the winter semester of 2018 he taught Cosmology to postgraduate students of the Physics Department of UOA.

• **Dr. Georgoulis** taught in the seminar with title “Solar Physics Research at GSU” at the Department of Physics & Astronomy, Georgia State University, USA, November 28

**Phds and Masters**

RCAAM researchers participate in other PhD supervision committees inside and outside of RCAAM. Specifically, during 2018 RCAAM members supervised the PhD of:

• Dr. Patsis is co-supervisor of the PhD thesis of Leonardo Chavez Velasquez at Instituto Nacional de Astrofisica, Optica y Electronica (INAOE), Puebla, Mexico, with title “Numerical and Analytical Studies of Orbits in Models of Spiral Galaxies” (in the framework of programm “7”). Mr. Chaves-Velasquez made a 2 month visit in RCAAM, while Dr. Patsis visited Mexico and INAOE Institute (25/8-8/9). Dr. Patsis is co-supervisor of the PhD thesis of Magdalini Aggelakopoulou with title “Numerical and theoretical study of 3-d Hamiltonian systems in Finance” (Department of Financial Studies, University of Thessaly. Moreover Dr. Patsis was member of the examining committee of the PhD thesis of Panagiotis Kyziropoulos with title “Study of computational methods for parallel simulation of the gravitational N-body problem”, at the Department of Electrical Engineering and Computer Engineering of the Polytechnical School of the University of Thrace (25/4).

• Dr. Efthymiopoulos supervises the PhD thesis of Constantina Zouloumi at the University of Athens with title “Manifold theory of the spires and multiple pattern speeds in simulations of N-body discs”. Moreover Dr. Efthymiopoulos was member of the advisory board of the PhD thesis of Panos Kyziropoulos at the Department of Electrical Engineering and Computer Engineering of the Polytechnical School of the University of Thrace (successfully presented in April 2018).
• Dr. Contopoulos supervised the PhD thesis of E. Coutsantoniou with title “Study of radiation of the accretion discs around black holes”. He is also member of the advisory committee of the PhD thesis of N. Trifonidis (AUTH) with title “Computational study of nonlinear phenomena of MHD with applications in Astrophysics” and of the PhD thesis of X. Sinnis (UOA) with title “Study of the stability of relativistic magnetised astrophysical jets”. He is also external reviewer of the PhD thesis of Loic Chantry at the Meudon Observatory and University 7 of Paris with title “Relativistic Jets: modeling using meridional self-similar methods for MHD flows around Kerr hole” and of Abdulina Kamila, at the Moscow Insitute of Physics MEPhI with title “Numerical modeling of solidification process of an aluminum alloy with magnetic stirring at the solidification front”. Finally, Dr. Contopoulos is member in the examining committee of the MSc thesis of Petros Stefanou (UOA) with title: “Production of gamma rays in the outer magnetosphere of pulsars”.

• Dr. Vasilakos supervises the PhD thesis of Ioannis Papagiannopoulos at the University of Athens with title “Study of symmetries in cosmological models of alternative gravity”. Moreover, he supervises the Phd thesis of Fotios Anastopoulos (UOA) with title “Study of the accelerating expansion rate of the Universe” and the PhD thesis of Pavlina Tsiapi (NTUA) with title “Study of the dark energy via cosmological microwave radiation from Planck”. Finally, Dr. Vasilakos is member in the advisory board of the PhD thesis of A. Papageorgiou (AUTH) with title “Cosmological parameters and dark energy”, A. Triantafyllopoulos (UOA) with title “Finsler geometries and cosmological extensions” and G. Gakis (NTUA) with title “Generalized theories of gravity in the tangent bundle”.

• Dr. Georgoulis is member of the advisory board of the PhD thesis of Loukas Xaplanteris at the Department of Physics in UOA with title με θέμα “Coupling between primary and secondary cosmic radiation coming from galaxies and the sun”. Dr. Georgoulis was the supervisor of the MSc thesis of Evangellia Samara, Department of Physics of UOA, with title “Magnetig field of CMEs and its effect on planetary magnetospheres: Methods and applications in exoplanets”. (successfully presented in June 2018).

• Dr. Harsoula is member of advisory board of the PhD thesis of Constantina Zouloumi with title “Manifold theory of the spires and multiple pattern speeds in simulations of N-body discs”.

**Missions – Visits to other Research Institutions**

1. **Panos Patsis**
   Invited visitor in the “Instituto Nacional de Astrofísica, Óptica y Electrónica”
(INAOE) (October 1-15) by the Professor I. Puerari for collaboration with his group in the field of Galactic Dynamics, where he made 3 seminars (PP-2)

2. Christos Efthymiopoulos
Invited visitor in the framework of a funded program in the Astrophysics Laboratory of the University Aix- Marseille (1/9-30/9).
He also visited the Astronomical Institute of the Czechisch Academy of Sciences (16/11-26/11).

3. Ioannis Contopoulos
He visited the Department of Chemical Engineering of NTUA in the framework of the postgraduate program in Computational Mechanics. Talk IC-4
He visited the NASA/Goddard Space Flight Center, Greenbelt, MD, USA. Talk IC-5
He visited the Department of Astronomy of the University of Chicago, May 9. Talk IC-6
He visited the Institute of Physics MEPhI of Moscow, September 6. Talk IC-7
He visited the Institute of Planetology and Astrophysics of the University of Grenoble, October 16. Talk IC-8

4. Spiros Basilakos
He visited the Department of Physics of the University of Barcelona (09/11-11/11) where he made an invited talk.

5. Μ. Γεωργούλης
He visited, after invitation, the following institutes and he made the following seminars: School of Aviation Medicin of the 251 General Hospital of HAF, January 25-26 2018. Two seminars with title: “The Solar Atmosphere” and “Space Weather and its Impact”.
Department of Physics & Astronomy, Georgia State University, USA. Seminar with title “Predicting Solar Flares and the Magnetic Field of Coronal Mass Ejections: Methods, Techniques and Implications for the Solar – Stellar Connection”, March 18.
Department of Mathematics, University of Sheffield, Μεγάλη Βρετανία. Seminar with title “From Physical Understanding to Forecasting of Solar Flares and Coronal Mass Ejections”, March 27.
Data Mining Lab, Department of Computer Science, Georgia State University, USA. Seminar with title “Predicting Solar Flares and the Magnetic Field of Coronal Mass Ejections: Methods, Techniques and Implications for the Solar – Stellar Connection”, October 30 Department of Physics & Astronomy, Georgia State
University, ΗΠΑ. Seminar for the 3d year students with title “Solar Physics Research at GSU”, November 28.

He also visited, after invitation, the Department of Physics and Astronomy of the State University of Georgia, Atlanta USA as visiting professor of the department (he is in sabbatical leave from September 2018 in this Department.

**Incoming Visitors**

- Dr. P. Papadopoulos, associate professor in the University of Thessaloniki was hosted at RCAAM for collaboration with Dr. Patsis and Dr. Basilakos.

- Dr. K. Gourgouliatos (Leeds University, UK) (February 13 - March 3) was hosted at RCAAM in the framework o MPNS COST Action MP1304 “Exploring fundamental physics with compact stars” (funded by the European Science Council) for collaboration with I. Contopoulos, on the evolution of neutron star magnetic fields.

- Prof. Demosthenes Kazanas (NASA/Goddard Space Flight Center, USA), (March 20-22) was hosted at RCAAM for collaboration with I. Contopoulos on the magnetic winds from black hole accretion disks.

**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 were invited to give lectures in educational institutions and events for the public. They also wrote articles for the public while their interventions helped to disseminate the research results of the Centre.


- P. Patsis: “Spirals, bars boxes and peanuts”. Talk at the Department of Physics of the University of Athens - Gerostathopouleio Observatory (April 20).

"Spirals, bars, boxes and peanuts - The morphology of the Galaxy and other spiral galaxies". Article in "Prisma"- Avgi newspaper, May 5
“How star trajectories build the galaxies”. School-Conference “Physics charms” for students of the Hellenic Physical Society, University of West Attica (December 16)

- C. Efthymiopoulos: Χ. Ευθυμιόπουλος: Conduct of the “Eratosthenes’s experiment”, in collaboration with the school of Anavryta and the first Gymnasium of Papagou, March 2018

“The hypothesis of the 9th planet”. School-Conference “Physics charms” for students of the Hellenic Physical Society, University of West Attica, December 16

“What is in the sky?”, Gymnasium-Lyceum of Elateia, April 18.

- I. Contopoulos: “Photographing a black hole in space”, 12th elementary school of Glyfada, February 1

“Photographing a black hole”, Gymnasium-Lyceum of Holy Metropolis of Peiraias, March 7

“Photographing a black hole in space”, Student meeting “Physics Charms”, Hellenic Physical Society, Thessaloniki, March 17-18

“Photographing a black hole”, Summer School of the Hellenic Physical Society in Aigina, June 24

“The end of Science”, 2nd Gymnasium of Kallipolis, December 21

“The end of Physics?” Student meeting “Physics charms”, Hellenic Physical Society, University of West Attica, Athens, December 14-16

- C. Gontikakis: “Comets”, Lyceum of the youth penitentiary center of Avlona, February 15

- M. Georgoulis: “Solar Flares and space weather: the puzzle and the adventure of prediction”, 6th Astronomical Festival of Chios, August 18

“Physics: Simple laws – Timeless ideas”, Physics Museum of the first Gymnasium of Chios, August 22

- Three interviews:
  - “The dark side of the Sun”, zougla.gr, May 19.
  Webspage: https://www.zougla.gr/epistimi/sinentefksis/article/i-skotini-plevra-tou-iliou
  - Filmed interview for solar storms, for the website zougla.gr, May 20 2018. Available in Youtube: https://www.youtube.com/watch?v=NenGt3yE4Zc
  - “Contemporary Icarus survive in the breath of sun..”, webpage of Huffington Post Greece, 2 December 2018.
• Creation of the webpage of the book “Space weather”, which he is invited to write for the series named “Small Introductions” of the Papadopoulos editorial press from the president I. Papadopoulos and the director of the series journalist Babis Papadimitriou. This book is going to be published in January 2019. Webpage: https://www.epbooks.gr/product/101737/diastimikos

• Participation in the formation of the programm of scientific events Συμμετείχε στη διαμόρφωση του προγράμματος επιστημονικών εκδηλώσεων “Ομηρείου Έργα”, as a member of the scientific advisory board of Omireion Center of Chios.

• Participated as an honorable member of the Chios Astronomical Club, in the meeting of the direction board of the club with the mayor of Chios in order to find a permanent place for the club, proper for day and night astronomical observations.

• M. Harsoula: Talk in the final class of the 12th elementary school of Chalandri with title “Exploring the near Universe”, January

Talk in the final class of the 7th elementary school of Agia Paraskevi with title “Exploring the near Universe, February 2018

Talk in the second class of the 1st Gymnasium of Papagou with title “Exploring the near Universe, May 2018

Talk in the school of the youth penitentiary center of Avlona with title “A tour in the near and far Universe”, May 2018

Participation in “Heraosthenes’s Experiment” in the 1st Gymnasium of Papagou, March 2018


• I. Contogiannis: “Sun, the day star”, Lyceum of the youth penitentiary center of Avlona, March 2018.