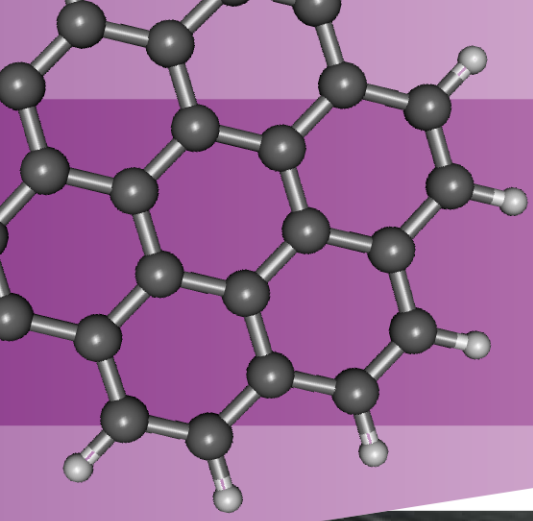
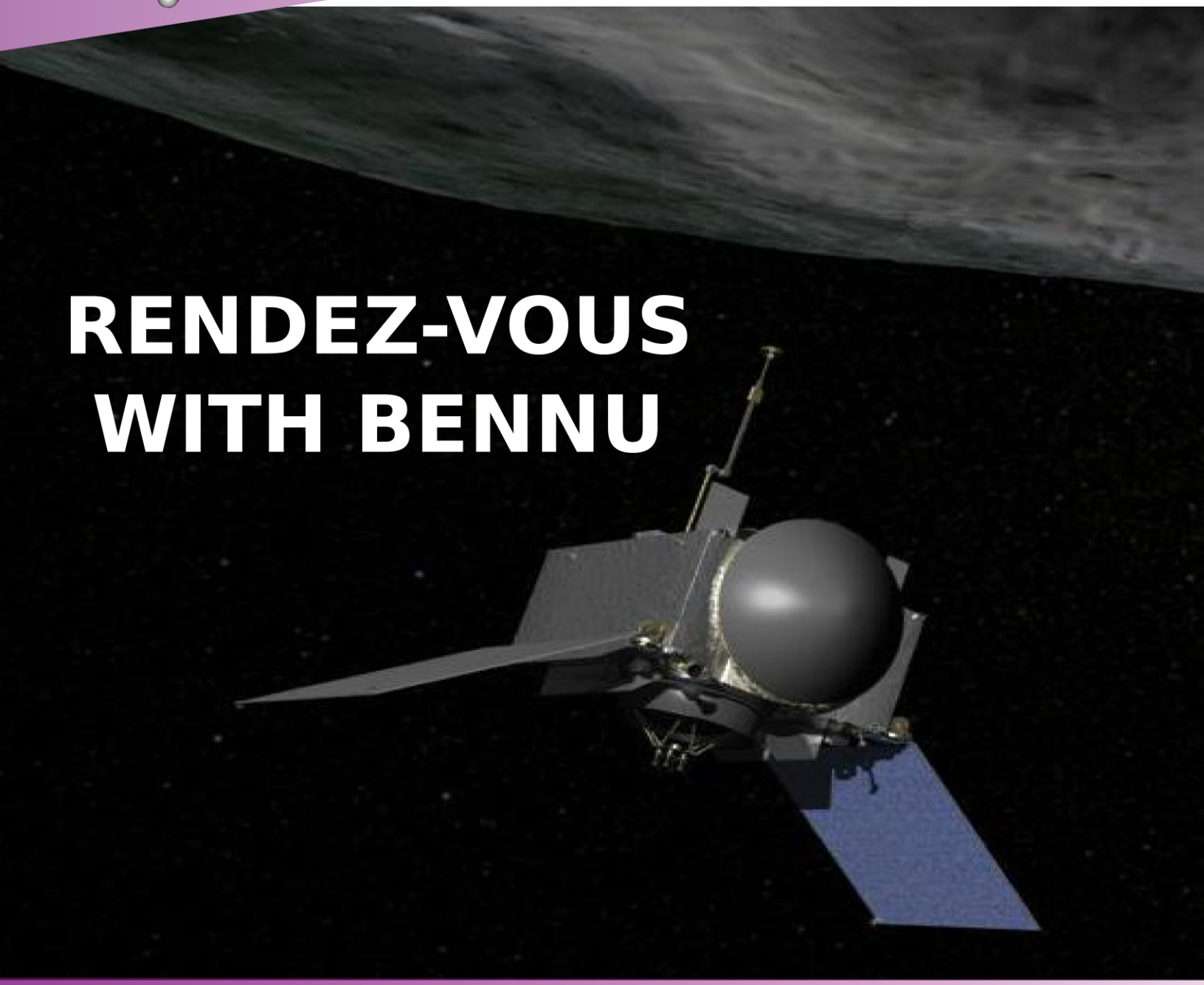


AstroPAH

A Newsletter on Astronomical PAHs

Issue 53 | november 2018



RENDEZ-VOUS WITH BENNU

Editorial

Dear Colleagues,

Welcome to our November issue of AstroPAH with an artist concept of OSIRIS-REx rendev-vous with asteroid Bennu on the cover. The main goal of OSIRIS-REx is to bring a sample of Bennu back to Earth for analysis. Bennu is a carbonaceous asteroid whose composition is thought to reflect both the interstellar and circumstellar environments, i.e. including aliphatic hydrocarbons and polycyclic aromatic hydrocarbons.

In this issue, we present in our In Focus section a compilation of interviews with Early Stage Researchers pursuing their PhD within the European Training Network EUROPAH. Their inspiring responses bode well for the future of our field.

A vast array of interesting subjects is covered in our Abstracts section, as usual. Do not skip any!

In our Meetings section, you will find the second announcement for the IAU Symposium on Laboratory Astrophysics that will be held April 14-19, 2019 in Cambridge, UK, and the first announcement for the conference on ”Linking the Milky Way and Nearby Galaxies” that will be held 3-7 June, 2019 in Helsinki, Finland.

Do you have a picture or photo that you would like to see featured on our cover? Suggest it as Picture of the Month! Do you have a contribution for the In Focus or upcoming events you wish to advertise amongst our community? Please let us know! Please also inform us of any prizes and funding being awarded, so that we may share these happy moments with our community. Visit our webpage (http://astropah-news.strw.leidenuniv.nl) or contact us for more information. We thank you all for your contributions and please keep them coming. You can send us your contributions anytime. For publication in December, see the deadlines below.

Enjoy reading our newsletter!

The Editorial Team

Next issue: 20 December 2018.
Submission deadline: 7 December 2018.

Contact us:

astropah@strw.leidenuniv.nl
http://astropah-news.strw.leidenuniv.nl
Click here to Subscribe to AstroPAH
Click here to Contribute to AstroPAH

Contents

PAH Picture of the Month

Artist concept of OSIRIS-REx at asteroid Bennu. OSIRIS-REx is NASAs first sample-return mission to an asteroid. Bennu is an ancient relic from the early beginning of the Solar System and is rich in carbon-based materials. One of the goal of the mission is to check for the presence of PAHs. At the moment of writing the caption, OSIRIS-REx is only about 120 km (75 miles) from the asteroid. Updates on the mission can be found on the website https://www.asteroidmission.org/ or following @OSIRISREx on Twitter.

Credits: NASA/Goddard/Chris Meaney

Newsletter Design: Isabel Aleman
Background image: NASA, ESA, and the Hubble Heritage Team (STScI/AURA)

In Focus

Interview with the Early Stage Researchers of EUROPAH

In this months In Focus, we present a compilation of several interviews with Early Stage Researchers from the European Training Network EUROPAH (Extenstive and Ubiquitous Role of Polycyclic Aromatic Hydrocarbons). EUROPAH is funded by the European Commission under the Horizon 2020 Marie Skłodowska-Curie Action. The network began in 2016 and consists of 16 early stage researchers (ESRs, PhD students) spread across 13 research groups in 6 European nations working to uncover the many roles of PAHs in the interstellar medium. The group is pictured in **Figure 1**.

Figure 1: Group picture of the EUROPAH ESRs. From left to right: Shreyak Banhatti, Tang Zeyuan, Lorenzo Maddii Fabiani, Sanjana Panchagnula, Martin Alliati, Rijutha Jaganathan, Michał Bulak, Lindsey St. Mary, Julianna Palotás, Dario Campisi, Evgeny Posenitskiy, Gabi Wenzel, Laurene Cheilan, Georgios Pantazidis, and Rushdi Delan Senevirathne.

In these interviews, we asked the ESRs to tell us a bit about their research and discuss their involvement and aspirations in the field of astronomical PAHs, as well as highlight some of the benefits of being part of a European Training Network. Their inspiring responses bode well for the future of our field.

Website europah.com
Facebook euroPAH
Instagram esr.europah
euroPAH
the extensive and ubiquitous role of polycyclic aromatic hydrocarbons in space

For more information about the EUROPAH network, you can read the In Focus from AstroPAH's 30th issue (July 2016).

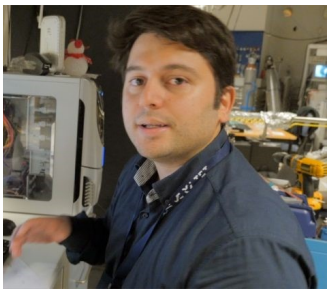
The interviewees were Georgios Pantazidis, Tang Zeyuan and Rijutha Jaganathan from Aarhus University (Denmark); Dario Campisi, Sanjana Panchagnula and Michał Bulak from Leiden University (Netherlands); Lorenzo Maddii Fabiani from University of Münster (Germany); Martin Alliati from University of Liverpool (United Kingdom); Gabi Wenzel from Paul Sabatier University (France); Julianna Palotás from Radboud University (Netherlands); and Laurene Cheilan from University of Bristol (United Kingdom).

First, please briefly described your research

Georgios: I am using surface science techniques such as scanning tunneling microscopy and temperature programmed desorption to investigate the photocatalytic activity of hydrogen-functionalised PAHs in the interstellar medium.

Tang: My research is mainly based on density functional theory calculations and machine learning methods. The goal is to investigate the catalytic properties of PAHs and their interactions with dust grains.

Rijutha: I use surface science techniques such as scanning tunneling microscopy, X-ray photoelectron spectroscopy and temperature-programmed desorption to study the functionalisation and catalytic properties of PAHs, with a particular focus on super-hydrogenated PAHs.

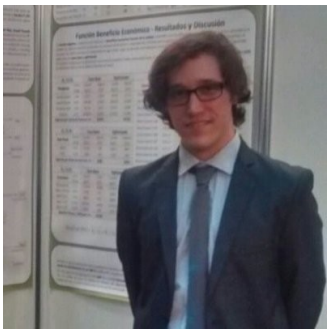


Dario: My time is divided between the computational study of PAHs in two different contexts: the formation of molecular hydrogen in the interstellar medium, and the catalytic reactions of PAHs in meteorites to form amino acids.

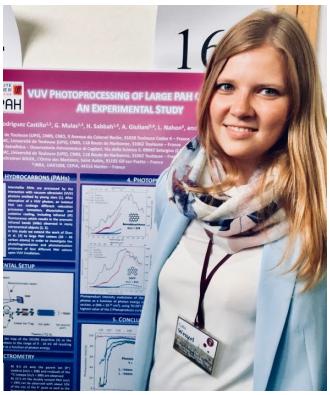
Sanjana: I study the photodynamical processes of PAH fragmentation in the interstellar medium using ion trap time-of-flight mass spectrometry, with a current focus on dehydrogenation pathways and laser-induced fragmentation.

Michał: My task is to simulate and explain the processes that take place in cold environments on the dust grains in the interstellar medium. My laboratory approach uses laser desorption techniques, soft photon ionisation time-of-flight mass spectrometry and UV-VIS spectroscopy to understand the chemistry triggered by photon irradiation of the PAHs immersed in interstellar ice analogues.

Lorenzo: The aims of my research are to study the photon-induced catalytic properties of PAHs towards molecular hydrogen formation. The reaction is induced by femtosecond laser pulses and the detection of molecular hydrogen through REMPI measurements. A kinetic description of the process can then be achieved.



Martin: I use inductively coupled plasma mass spectrometry to look at the interactions and fragmentation patterns of PAHs and energetic electrons in a plasma. To support these experiments, I use plasma kinetic modelling to simulate a reaction network that includes reactions between heavy molecules and electron-impact reactions, as well as ab initio methods to study electron-molecule scattering processes.



Gabi: My PhD work is to investigate the ionisation, fragmentation and radiative cooling processes of UV photon-excited PAHs by using experimental ion trap techniques in order to advance insights into the contribution of the different relaxation channels as a function of internal energy and molecular properties.

Julianna: My project is to investigate the chemistry of large carbonaceous molecules by gas-phase IR spectroscopy and mass spectrometry. We study PAH ions with IR multi-photon dissociation spectroscopy using the FELIX free electron laser.

Laurene: I am a social scientist who studies how public engagement emerges within the EUROPAH network. Relying on the theories of science communication, I am conducting an ethnography in order to collect data that I will then analyse to provide better understandings of this process of engagement.

As we can see, EUROPAH is promoting talented young researchers to come together and tackle research that is aimed at disentangling many of the interwoven aspects of astronomical PAH research through multiple techniques. After finding out about their research, we went on to ask them questions that range from how they became involved in PAH research, to how they handle the challenges of being a PhD student in the (mostly) physical sciences.

What made you choose this field?

Georgios: I did my Master's in Materials Physics and I was really interested in surface science and catalysis, so I wanted to pursue a PhD in this field. When I stumbled upon the advertisement for this project it really called out to me since it applied the surface science techniques I was interested in to the extremely exciting context of interstellar space.

Rijutha: My interest in astronomy began in high school. During my undergraduate studies I attended many summer schools, workshops and public lectures in astronomy. One such talk by

David Lambert titled “The Heaven’s Kitchens” was about the chemical evolution of the universe. The talk sparked my interest in astrochemistry and I got to work in the field as a visiting student at Tata Institute of Fundamental Research (Mumbai, India). I enjoyed the interdisciplinary nature of the field and was even more excited to combine it with surface science techniques for my PhD research.

Dario: As a chemist I spent many years studying reactions that take place on Earth, but I was always interested in expanding my knowledge to extraterrestrial environments. Quantum chemistry, in particular, can really be thought of as “general” chemistry since chemical modelling allows you to study all kinds of physical phenomena in the universe. I’d like to use it as a tool to shed light on the mysteries of the universe.

Sanjana: Astrochemistry allows me to apply my background as a chemist to a field I’ve always been curious about astronomy. I enjoy the opportunity and the challenge to turn my pastime into a career.

Michał: What sparked my interest and kept me challenged was the idea of simulating the processes taking place in the far universe, here on Earth. In an astrochemical laboratory, one can lose sight of the beauty and complexity of this concept. Having the Sackler Laboratory embedded into a very dynamic environment of the Leiden Observatory keeps the link fresh and stimulating.

Lorenzo: I’ve always been in love with astronomy. I pursued university studies in Astrophysics which then oriented my interest towards the “origin of life”. I think studying molecular formation in the interstellar medium is the best way to merge both these aspects together.

Laurene: I’ve worked in various scientific centres in France for five years where I coordinated projects involving researchers, artists and the general public. The experience made me want to gain a deeper understanding of the dynamics at stake in scientific public engagement a fascinating, ever-changing field.

Tell us about your experiences within the European Training Network EUROPAH. How is it different from other PhDs?

Georgios: First, [it is different because of the] idea and structure of an actual network of people. It is really interesting to see the collaborations that have emerged during meetings and that will emerge during our secondment periods at different universities. [The second difference] is the implementation of industrial partners in the network. We have the chance to visit large suppliers of scientific equipment and to get an insight in the industrial process. Consequently, our employability prospects are significantly improved since we have exposure to both, academia and scientific industries.

Tang: In EUROPAH, we have more opportunities to go abroad for research, training and conferences than other PhDs. We collaborate with researchers from different backgrounds and different countries.

Rijutha: As soon as I joined Aarhus University for my PhD, I had to attend a EUROPAH training event and just like that I had new friends who were going through the same things as me. The 16 of us encourage and support each other and that is one of the best things of being together

in this network. Apart from that, the network opens an easy route to collaborations among the 16 PhD students. The multiple training events as a part of the network are also useful to gain insight into other techniques of which some may complement my own work.

Dario: EUROPAH gives me the opportunity to form new collaborations between different European institutes, allowing me to travel a lot in order to enrich my scientific and professional skills.

Sanjana: Being a part of this network has enabled me to meet like-minded researchers both, early in their scientific careers as well as the pioneers of the field. It's introduced me to a warm, engaging community that strives to deliver good science, and provides enriching scientific and social experiences.

Michał: A goal of this network is to shape us into well-rounded scientists and that includes exposure to new experiences. Besides opening my horizons to the multidisciplinary applications of PAH research (e.g. OLEDs, zebra fish toxicology) I have received training in laboratory techniques from multiple academic and industrial institutions. Travelling all over Europe and meeting fellow ESRs who tackle similar issues ignites international friendships and collaborations. Generally, the network makes is easier to access certain possibilities towards a professional development, which could be strenuous for other PhD candidates.

Martin: As part of a training network, we are given more and better opportunities than a regular PhD to learn from world class researchers in our field through dedicated trainings and hands-on sessions. This has been of an invaluable relevance in my case, as I come from a different scientific background. Also, the fact that there are 16 PhD students aiming towards a common objective makes things easier and more fun we know we can count on each other, be it for science-related issues or not.

Gabi: We receive a broad training on many new experimental, theoretical and computational techniques. This is provided by our host universities, but also through summer schools organised by EUROPAH and collaborations/secondments within the network. There's always a helping hand, advice, discussions and a constant active exchange of research taking place on an international level. It is awesome to know so many interesting people coming from all over the world and who all share my love for science!

What do you wish to accomplish in the field? / What are the most important questions you want to see answered?

Tang: I wish to understand the mechanisms of small molecule (like H_2O, NH_3) formation on PAHs, and the growth processes from small PAHs to large PAHs on dust grains.

Dario: I would like to shed light on the catalytic properties of PAHs in space, in particular, how they can act as catalysts for H_2 formation and for more complicated species like amino acids.

Sanjana: I hope to be able to improve the experimental techniques we currently use to study interstellar PAHs. It'd be great if we could unambiguously assign a DIB to a PAH.

Michał: Are PAHs responsible for the catalysis of any of the prebiotic molecules? And, of course, is there extraterrestrial life?

Lorenzo: I'd like to help bring together the data we obtain from astronomical observations with laboratory and theoretical studies, and maybe someday even in-situ measurements.

Laurene: I want to understand how scientists truly engage with the non-scientific community, not just in the context of outreach events but also on a day-to-day basis. A lot of research has been done on the importance of informing the general public about "relevant" scientific issues, e.g. health/environmental science, but the larger part of scientific research doesn't actually have such a clear and direct link to the benefit of society and it's crucial to understand how scientists working in these fields convey their research to the public.

What are your career goals once you graduate from your PhD?

Georgios: It is still quite early to know for sure, but at the moment, I think I would like to stay in academia, though I'm keeping the option of entering industry open.

Tang: I want to stay in academia and find a postdoctoral position in Europe. The ultimate goal would be to obtain a faculty position in a university or a research institution.

Rijutha: I would like to take up a postdoctoral position in laboratory astrochemistry and work in Europe for a few more years before moving back to my home country, India. I am also keen to pursue popular science writing and maybe secure some training in that.

Dario: I would like to become a professor one day and have my own research group that focuses on popularising the concept of astrocatalysis.

Sanjana: As it stands, I will most likely stay in academia with the intention to become a professor. However, I'm open to considering other non-academic avenues in science.

Martin: I really enjoy what I do right now, so I intend to continue with my postdoctoral studies soon after my PhD. In the long term I'd like to find a niche for myself, something to specialise in and become an expert on. I'd say my biggest ambition is to identify an area of research that hasn't really been explored so far and take the first steps towards creating what could be a new field of study in the future.

Gabi: I love the idea of staying in academia and doing further research in the field of laboratory astrophysics and perhaps also contributing to (under-)graduate students' education. During my own undergraduate studies, I taught at my university for more than three years, and I liked it a lot. Nevertheless, I know how difficult it is to find a permanent position in academia so I'm trying to keep myself open to other possibilities.

Laurene: I would like to continue with my research in public engagement as I think that, in societies like ours shaped by techno-sciences, it is important to highlight the dialogue between science and society.

What is the most important advice you've received? (academic or or general)

Georgios: Find something that you enjoy (both in your work and in your life) and just run with it.

Dario: Meet as many new people as you can and do what you must to facilitate new scientific collaborations.

Sanjana: It's not exactly advice, but this is something I came across a while ago: "Great things are done by a series of small things brought together." Vincent van Gogh. It's easy to become enamoured by the bigger picture, particularly in science, but if you do what you do well things will always work out in the end.

Martin: After finishing my Master's thesis, my supervisor said to me that I was made for research and that I would only really find myself challenged by and excited about my work if it were in academia. I was very thankful for her words, but I took it as a compliment rather than a piece of advice, partially because I'd recently accepted a position in industry. Three years later, I left the industry and started my career as an academic through this PhD for the very reasons she mentioned.

Laurene: Write every day. It is a really crucial piece of advice in social research as writing shapes our thinking and help us follow the evolution of our ideas in time. Writing at least 500 words daily is the best daily routine a social researcher can have.

How do you balance your personal life and work life?

Georgios: I stay active by pursuing my hobbies and spending time with nice people, making sure to give my social life just as much of a priority as my work life. Following a schedule (with the necessary amount of flexibility) helps me maintain the balance by allowing me to distribute my time more efficiently.

Dario: I do my best to not work outside working hours and vacations. I aim to maximise my efficiency during the day so that I can relax during evenings/weekends.

Sanjana: It's always hard to strike the right balance but I try to make time for myself, my friends/family, and my hobbies/interests. I do my best work when I'm happy so I try and keep myself surrounded my good people, good music, good food and good vibes.

Martin: I find it quite difficult to set boundaries between my work and personal life, mainly because it is in my best interest as a PhD student to spend as much time learning as I can. And having access to my university e-mail/files from my phone is a double-edged sword as I can work from anywhere, at any time but it cuts into my downtime. So I've enforced a "phone ban" from 20;30 to 08:30, which means that I am no longer constantly reading through office e-mails, etc. As is the case with most people, I used to wake up and reach for my phone immediately (more out of habit rather than a necessity). Now my morning routine is "offline" and it really helps me center myself before getting in to work.

Laurene: I have two children aged 3 and 8. In a sense, they help me a lot in creating the balance because I have to take care of them, so even if there are times when I would rather work all through the night I always have to stop in order to come home and be with my family. As I also need a lot of physical exercise in order to counterbalance my long days of sitting at a desk and reading or writing, I practice Shaolin kung-fu with my daughter at least twice a week and I use my bicycle to travel around!

Abstracts

Molecular hydrogen formation in the interstellar medium: the role of polycyclic aromatic hydrocarbons analysed by the reaction force and activation strain model

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The formation of H_2 onto pyrene (from hydrogen atoms) was studied in the framework of the Eley-Rideal mechanism, which was fully analysed for all the adsorption sites of pyrene. The structural and electronic contributions to the activation energies were characterized through the reaction force and activation strain model (ASM). The reaction force indicates that the activation process of the hydrogen chemisorption is dominated by the structural rearrangements of reactants rather than by electronic reordering. Furthermore, the ASM shows that the structural rearrangements are driven by the approach of hydrogen to the pyrene surface, which generates a strong repulsive interaction. However, the changes in the geometry of the surface generate a minimal increase of the total energy, being negligible at the absorption sites at the edge of the surface. For that reason, the process is most kinetically favoured at the edge sites, which have lower activation energies ($\sim$ 1-3 kcal mol^{-1}) than the internal ones ($\sim$ 6 kcal mol^{-1}). On the other hand, the recombination of hydrogen atoms for the subsequent H_2 formation is a barrier-less process, no matter the adsorption site of the carbonaceous surface. The ASM analysis shows that the attractive interactions take place at the beginning of the recombination process, they avoid that the energy barrier can be generated by structural distortions. Both the chemisorption and the abstraction of the adsorbed hydrogen atom by an incoming H atom, throughout the entire surface, are highly exoenergetic processes, with reaction energy values in the range of -12 to -36 kcal mol^{-1}and -84 to -60 kcal mol^{-1}, respectively.

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https://academic.oup.com/mnras/article/481/3/3052/5105891

Adsorption of Organic Molecules on Onion-Like-Carbons: Insights on the Formation of Interstellar Hydrocarbons

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Using atomistic simulations, we characterize the adsorption process of organic molecules on carbon nanoparticles, both of which have been reported to be abundant in the interstellar medium (ISM). It is found that the aromatic organics are adsorbed more readily than the aliphatic ones. This selectivity would favor the formation of polycyclic aromatic hydrocarbons (PAHs) or fullerene-like structures in the ISM due to structural similarity. It is also observed in our simulations that the molecules form a monolayer over the nanoparticle surface before stacking up in aggregates. This suggests a possible layer-by-layer formation process of onion-like nanostructures in the ISM. These findings reveal the possible role of carbon nanoparticles as selective catalysts that could provide reaction substrates for the formation of interstellar PAHs, high-fullerenes and soots from gas-phase molecules.

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https://arxiv.org/abs/1810.11018

Study of fullerene-based molecular nanostructures in planetary nebulae

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The main goal of this thesis is to unveil some questions related to the formation of complex fullerene-based molecules in space, with the aim of resolving some key problems in astrophysics. The unexpected detections of fullerenes and graphene (possible C_{24}) in the H-rich circumstellar environments of evolved stars indicate that these complex molecules are not so rare and bring the idea that other forms of carbon such as hydrogenated fullerenes (fulleranes), buckyonions, and carbon nanotubes may be widespread in the Universe, being closely involved in many aspects of circumstellar/interstellar chemistry and physics. We explore this new and fertile field of research by focusing our study on some Galactic planetary nebulae (PNe) that contain fullerenes. In order to do this, we make use of laboratory spectra of several fullerene-related compounds and compare them with astronomical data. This work is a first step to open

up a new field of interdisciplinary research, crossing the boundaries between astronomers, chemists, and physicists, and understand the significant presence of fullerene structures in circumstellar/interstellar environments.

E-mail: jjairo@oan.es

Download: https://arxiv.org/abs/1810.09688

Spectroscopic characterization of the product ions formed by electron ionization of adamantane

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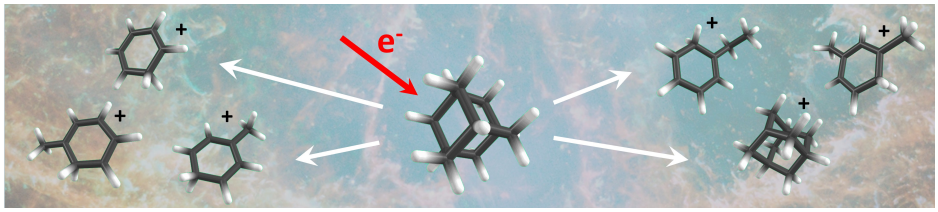
A structural characterization of the products formed in the dissociative electron ionization of adamantane ($C_{10}H_{16}$) is presented. Molecular structures of product ions are suggested based on multiple-photon dissociation spectroscopy using the Free Electron Laser for Infrared eXperiments (FELIX) in combination with quantum-chemical calculations. Product ions are individually isolated in an ion trap tandem mass spectrometer and their action IR spectra are recorded. Atomic hydrogen loss from adamantane yields the 1-adamantyl isomer. The IR spectrum of the $C_8H_{11}^+$ product ion is best reproduced by computed spectra of 2- and 4-protonated meta-xylene and ortho- and para-protonated ethylbenzenes. The spectrum of the product ion at $m/z = 93$ suggests that it is composed of a mixture of ortho-protonated toluene, para-protonated toluene and 1,2-dihydrotropylium, while the spectrum of the $m/z = 79$ ion is consistent with the benzenium ion. This study thus suggests that adamantane is efficiently converted into aromatic species and astrophysical implications for the interstellar medium are highlighted.



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In-situ nano-scale investigation of step retreat on fluoranthene crystal surfaces

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Fluoranthene, a polycyclic aromatic hydrocarbon (PAH), has been detected on Earth as well as in asteroids and meteorites, and may have played a role in the formation of life. Increasing the ionic strength of aqueous solutions has been observed to lower the fluoranthene solubility, but it is unclear how solution composition controls the release rate of fluoranthene to an aqueous solution. To elucidate this, we have performed in-situ AFM experiments in which we characterized the sublimation and dissolution behavior of fluoranthene crystal surfaces. From this we quantify the step retreat rate upon exposure to air, deionized water, and a 0.4 M NaCl or 0.1 M $MgSO_4$ solution. Surface roughness is the main factor that determines the dissolution or sublimation rate. The results imply that during fluoranthene remediation or breakdown in meteorites and asteroids, ionic strength will be more important than chemical composition for controlling fluoranthene release into solution.

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Nano Dust in Space and Astrophysics

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We summarize the Focus Meeting (FM10) "*Nano Dust in Space and Astrophysics*" held in Vienna, Austria on 28–29 August 2018 during the 30th General Assembly of the *International Astronomical Union* (IAU). The theme of this focus meeting is related to the detection, characterization and modeling of nano particles — cosmic dust of sizes of roughly 1 to 100 nm — in space environments like the interstellar medium, planetary debris disks, the heliosphere, the vicinity of the Sun and planetary atmospheres, and the space near Earth. Discussions focus on nano dust that forms from condensations and collisions and from planetary objects, as well as its interactions with space plasmas like the solar and stellar winds, atmospheres and magnetospheres. A particular goal is to bring together space scientists, astronomers, astrophysicists, and laboratory experimentalists and combine their knowledge to reach cross fertilization of different disciplines.

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http://arxiv.org/abs/1810.12502

Graphene and Carbon Nanotubes in Space

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As the fourth most abundant element in the universe, carbon plays an important role in the physical and chemical evolution of the interstellar medium. Due to its unique property to form three different types of chemical bonds through sp^1, sp^2, and sp^3 hybridizations, carbon can be stabilized in various allotropes, including amorphous carbon, graphite, diamond, polycyclic aromatic hydrocarbon, fullerenes, graphene, and carbon nanotubes.

E-mail: lia@missouri.edu
To appear in "*Astronomy in Focus*" for the Focus Meeting (FM10) "*Nano Dust in Space and Astrophysics*" (28–29 August 2018; Ingrid Mann, Aigen Li, Kyoko K. Tanaka) of the 30th General Assembly of IAU in Vienna, Austria
http://arxiv.org/abs/1810.06786

Meetings

Second Announcement
1st IAU Symposium on Laboratory Astrophysics From Observations to Interpretation IAU S350

Jesus College, Cambridge, UK

14 - 19 April 2019

Registration & Abstract Submission now OPEN

Please visit the conference website for full details and to start your registration:

http://www.astrochemistry.org.uk/IAU_S350/

The active synergy between astronomical observation, laboratory experiments and theoretical modelling has become vital in realising the full scientific yield of astronomy telescopes and space missions. Consequently, the field of Laboratory Astrophysics is now established as a fundamental element of modern astronomy. This meeting will bring together researchers in theoretical or experimental chemistry and physics with those in astronomy and space missions to discuss the latest challenges and recent successes in experimental and theoretical laboratory astrophysics and astrochemistry. The website includes full details of the topics covered, and scientific fields in which abstracts are solicited. We anticipate that the meeting will reflect the depth, diversity and scientific excellence of this field, and encourage you to register, and submit an abstract, as soon as possible.

Key deadlines:

- **Dec 1st** for travel grant & financial assistance
- **Dec 1st** for abstract submission for oral contributions (and oral / poster contributions by those requesting financial assistance)
- **Feb 1st** for Early Bird Registration Fee
- **Feb 1st** for abstract submission for poster contributions
- **Mar 1st** for Full Registration

Confirmed Invited Speakers:
Ewine van Dishoeck (plenary), Yuri Aikawa, Kathrin Altwegg, Olivier Berné, Til Birnstiel, Jürgen Blum, Adwin Boogert, Fred Ciesla, Thomas Gautier, Ulrike Heiter, Cornelia Jäger, Anders Jerkstrand, Inga Kamp, Ciska Kemper, Kei Kotake, Karin Lind, Win Ping Liu, Johan Olofsson, Juliet Pickering, Sergio Pilling, Cristina Puzzarini, Hendrik Schatz, Stephan Schlemmer, Bhalamurugan Sivaraman, Jonathan Tennyson, Patrice Theulé, Véronique Vuitton, Peter Young, Naoki Watanabe

On behalf of the Organizing Committees for IAU S350,
Farid Salama (SOC) & Helen Fraser (LOC)

IAUS 350 SOC:
Farid Salama (Chair), USA, Paul Barklem, Sweden, Helen Fraser, UK, Thomas Henning, Germany, Christine Joblin, France, Sun Kwok, China, Harold Linnartz, Netherlands, Lyudmila Mashonkina, Russia, Tom Millar, UK, Osama Shalabiea, Egypt, Gianfranco Vidali, USA, Feilu Wang, China, Giulio Del Zanna, UK

First Announcement

Linking the Milky Way and Nearby Galaxies:

The ISM and Star Formation from Cold Cores to kpc Scales

Helsinki, Finland
3 – 7 June 2019

Scientific Rationale: ISM and star-formation studies of the Milky Way and of nearby galaxies are being performed on progressively overlapping physical scales. This is a result of the increasing resolution of both simulations and observations. The gap between Galactic and extragalactic studies is bridged by facilities such as ALMA, GAIA, JVLA, MUSE, and the upcoming JWST. Galaxy simulations begin to break-down when sub-cloud-scale physics are not included and, conversely, studies of the Milky Way star-formation often ignore the larger, galactic context. Thus, now is the time to facilitate discussion between the Galactic and nearby galaxy communities among theorists and observers alike.

Abstract submission: The **deadline** for abstract submission is **20 January 2019**. Please note that due to venue capacity, the conference is limited to 100 participants. Final selection will be based upon scientific contribution and on a "first come first served" basis for the registration. Abstract submission and pre-registration may be completed now. Depending on final word from sponsors, the conference fee is expected to be between 200-300 euro. Final registration will be complete upon receipt of payment.

Topics to be addressed at the meeting include:

- 3D structure and dynamics of the ISM, including the impact of bars, spiral arms, and nuclear activity
- Cloud formation, cloud-scale and sub-cloud-scale physics, structure from filaments to cores, phase transitions, stellar feedback, and environmental factors
- Chemistry of the ISM, including tracers of physical conditions, formation and survival of molecular species
- The integration of sub-GMC/MC physics into larger-scale simulations with episodic star formation, feedback, and a universal star formation law

Invited speakers: Mélanie Chevance (Astronomisches Rechen-Institut), Bruce Elmegreen (IBM Research Division, T. J. Watson Research Center), Nanase Harada (Academia Sinica Institute of Astronomy and Astrophysics), Jouni Kainulainen (Chalmers), Steven Longmore (Liverpool John Moores University), Eve Ostriker (Princeton University), Snezana Stanimirovic (University of Wisconsin Madison).

For further information about the conference, please visit our website:
https://www.helsinki.fi/en/conferences/linking-the-milky-way-and-nearby-galaxies

E-mail for contact: mw-link2019@helsinki.fi

Looking forward to seeing you in Helsinki!

The Scientific Organizing Committee: Henrik Beuther (Max Planck Institute for Astronomy), Alberto Bolatto (University of Maryland), Edith Falgarone (Observatoire de Paris/ENS), Mika J. Juvela (University of Helsinki), Diederik Kruijssen (Heidelberg University/ARI), Satoki Matsushita (Academia Sinica Institute of Astronomy and Astrophysics), Naomi McClure-Griffiths (Australian National University), Elisabetta Micelotta (University of Helsinki), Paolo Padoan (University of Barcelona), Yancy Shirley (University of Arizona), Stefanie Walch-Gassner (University of Cologne), Christine Wilson (McMaster University), Laura K. Zschaechner (University of Helsinki).

The Local Organizing Committee: Mika J. Juvela, Emma E. Mannfors, Elisabetta Micelotta, Veli-Matti Pelkonen, Mika M. Saajasto, Laura K. Zschaechner.

AstroPAH Newsletter

http://astropah-news.strw.leidenuniv.nl
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Submission deadline: 7 December 2017