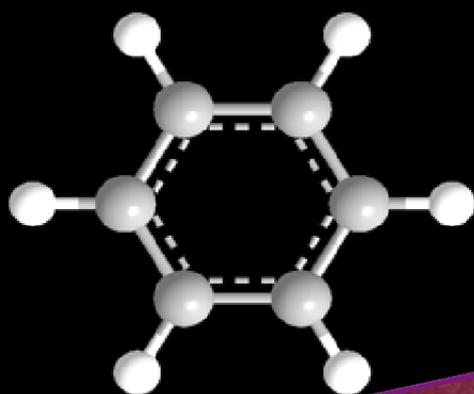
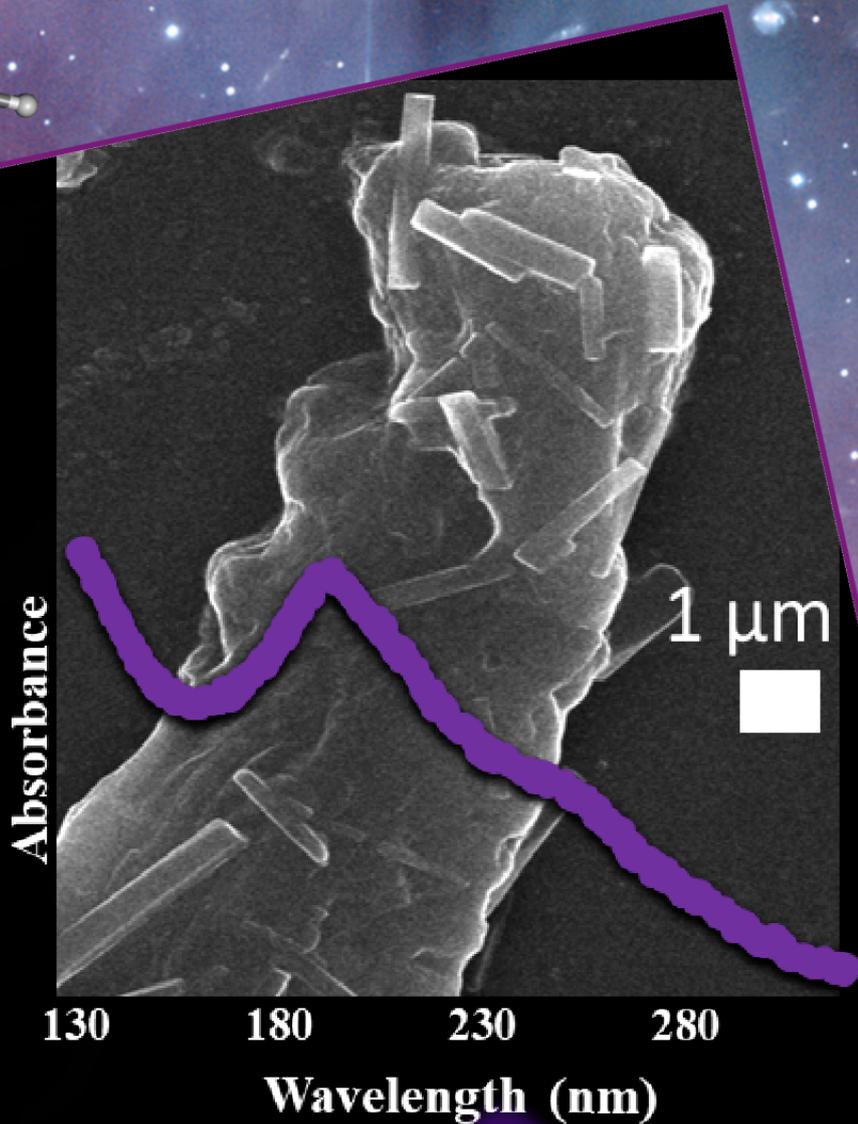
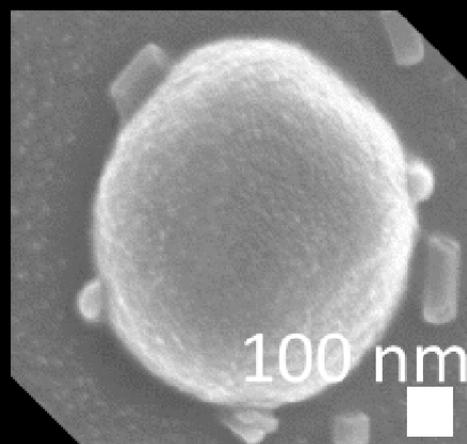
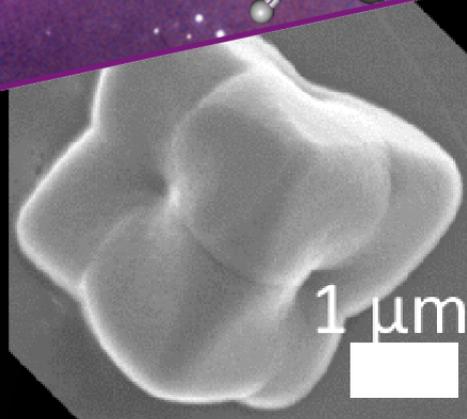
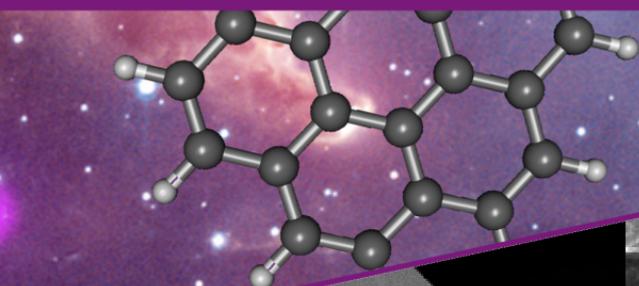


AstropAH

A Newsletter on Astronomical PAHs

Issue 65 • February 2020



4K

9 eV

**Geometric structures
in benzene ice**



Editorial

Dear Colleagues,

We are back from our annual January hiatus and very pleased to present our first AstroPAH newsletter of 2020!

We thank Dr. Bhalamurugan Sivaraman (Physical Research Laboratory, India) for his contribution to our Picture of the Month.

We start off the year with an interview with Dr. Alessandra Candian, a specialist in theoretical studies of spectroscopy and reactivity of astrochemically relevant C-containing molecules and who, until very recently, was part of our AstroPAH editorial team. We are very happy to have Alessandra sharing her experiences in this month's In Focus.

Many new papers have been published recently, and are featured in our Abstracts section. They cover a broad range of topics, from superhydrogenated PAHs, to benzene ice irradiation, to carbon nanotubes in the interstellar medium, to DIB carriers!

A number of upcoming meetings will be taking place in the coming months in Brazil (PAHs in the Universe), Denmark (The lifecycle of cosmic PAHs) and in The Netherlands (The Molecular Journey from Stars to Disks). All related information (speakers, abstract submission deadlines...) are detailed in this newsletter.

A PhD position at the Technische Universität Berlin is announced; please share the news with potential candidates!

We hope you enjoy reading our newsletter, and we thank you for your dedication and interest in AstroPAH! Do not hesitate to send us your contributions, and if you wish to contact us, feel free to use our email: astropah@strw.leidenuniv.nl.

Enjoy reading our newsletter!

The Editorial Team

**Next issue: 21 March 2020.
Submission deadline: 8 March 2020.**

AstroPAH Newsletter

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PAH Picture of the Month

Geometric structures observed in the aromatic residue made from VUV irradiation of benzene astrochemical icy analogues. More information in the paper [Rahul et al. \(2019\)](#).

Credits: Images: K. K. Rahul, B. Sivarman and colleagues. Montage: H. R. Hróðmarsson



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An Interview with Dr. Alessandra Candian

Dr. Alessandra Candian works at the University of Amsterdam (UvA) where she theoretically investigates the spectroscopy and reactivity of astrochemically relevant C-containing molecules. She was a recipient of a VENI Fellowship from the Netherlands Organisation for Scientific Research (NWO) to investigate the photoprocessing of large PAHs. She was one of the founding editors of the AstroPAH Newsletter and part of the editorial team until a few months ago. She received her Master in (Astro)Physics from the Università degli Studi di Padova (Italy). She then pursued her PhD in Chemistry at the University of Nottingham, combining ground-based astronomical observations, quantum chemistry calculations and modelling to study the Aromatic Infrared Bands and identify subclasses of PAH molecules as carriers. After a short visiting position at the Instituto de Astrofísica de Andalucía (Spain) studying dust formation in planetary nebulae, she moved to the Leiden Observatory first as a postdoctoral researcher and then as a VENI fellow.



Can you tell us how you got into PAH-related research?

It was serendipitous, as the best discoveries :) I really liked cosmology and as the topic of my *tesi di laurea* (equivalent to master thesis) in Physics, I chose the Cosmic Microwave Background (CMB), in preparation for the Planck mission. One of the foreground emissions that masks the CMB signal at radio frequencies comes from cosmic dust, and I was amazed to discover all the research carried out on dust and large macromolecules in space. I then decided I would pursue a PhD in that topic, and I was lucky enough to end up in the UK studying PAHs in the interstellar medium.

What did it mean for you to be part of the AstroPAH editorial team? What aspect did you like best?

It was a great experience both from the scientific and human point of view. I had the opportunity and the privilege to work with kind, creative and enthusiastic researchers and become their friend. I like very much the fact that we have different personalities and point of views, but we were able to merge them almost effortlessly in a unique vision. And I also like our evening board meeting/catch up sessions over several timezones on Skype.

What, in your opinion, is the most important advancement in PAH research that was accomplished during your time on the AstroPAH board?

This is a tough question! I would say the ability we have now to systematically study the photophysical and chemical behaviour of large PAHs and connect them to other interstellar molecules, such as C₆₀ and H₂. This kind of advancement is a vital step to understand the cycle of interstellar matter. Also, and I might be biased here, I am very excited about the recent developments in understanding how anharmonicity influences the aspect of the emission bands in PAHs. It will be incredibly important to push forward our understanding of the AstroPAH population when the spectra from the James Webb Space Telescope will be ready to be analysed (hopefully soon).

What is your next adventure in science going to be?

I want to understand how small and larger hydrocarbons are formed on Titan. The Cassini mission has showed us the presence of large and charged macromolecules in the ionosphere, meaning that molecular growth starts at much higher altitudes than previously anticipated. As the parameter space is huge I am looking into ways to deal with such complexity, for example using machine-learning techniques. I am quite excited about this new adventure!

Can you tell us about your career path, the difficulties you have faced as a scientist to stay in the field and what has guided your current choice?

As for many researchers, my career path has been influenced by a mixture of luck, coincidence and personal strong-will. After finishing a Master in Italy, I knew I wanted to do a PhD abroad AND in the field of astrochemistry. There were no fully-funded positions available at that time so I opted for taking a year off. One year later I ended up in the UK with a double competitive scholarship. At the same time my then-boyfriend started a PhD in Astrophysics in Spain so for the following three years we were in a long-distance relationship. After I finished my PhD, I became a visiting researcher at his institute until he also got a PhD, and he followed me to Leiden. In 2015 I got a VENI fellowship and in early 2016 my daughter was born. It was a very intense time. I had to show my independence as a researcher, increase my visibility and my participation in research-related activities while at the same time caring for a small child in a foreign country with no family nearby. I am lucky to have a very supportive partner and supervisors and amazing friends and role models that remind me that you can both have a family and a career.

In addition, a difficulty I see in my field, Laboratory Astrophysics, is the lack of dedicated funding and the fact that the research is not easily labelled as astronomy, chemistry, or physics, and unfortunately this can still be quite a disadvantage when looking for Tenure Track positions.

Astrochemistry is a very multidisciplinary field. You work with modelling and theoretical calculations for applications in Astronomy, which requires you to work amidst scientists in different fields (Physics, Chemistry, Astronomy).

Can you comment on how you collaborate and communicate with observers and experimentalists... and what do you like about such interactions? Do you prefer working in small or large groups and why?

Actually communicating with scientists in different fields and establishing a common language is one of my favourite parts of the job. I am fascinated by the fact that once you are communicating, you can start to see the situation/problem with the eye of the other scientist. At the same time you have to make an effort to be comprehensible, thus finding out how deep your knowledge is.

Also doing research with different scientists has taught me that it is OK to admit that I do not know things. While my character brings me to work in small groups because it is easier to focus and communicate, lately I have been involved in larger groups, where due to statistics you had more diversity. And I believe that diversity, while cumbersome to deal with at first, is what really makes the difference in solving scientific questions.

What was the most important advice somebody gave you?

“Do stuff you like with people you like”. It may seem a trivial advice but it was a game-changer for me.

How do you balance your professional and personal life?

I try to be focused when I am at work and present with my family when I am at home. Since I had a daughter I became more efficient and time-aware, but it is not always easy, as the pressure from work can creep into your family life. Sometimes I juggle too many balls and one drops; I try to forgive myself, move on and readjust the balance. Also I am learning to say no to things more often, and this is difficult since I am enthusiastic by nature.

Anything else you would like to share with AstroPAH readers?

Thanks for being such affectionate readers!



Abstracts

Are the Carriers of Diffuse Interstellar Bands and Extended Red Emission the Same?

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We report the first spectroscopic observations of a background star seen through the region between the ionization front and the dissociation front of the nebula IC 63. This photodissociation region (PDR) exhibits intense extended red emission (ERE) attributed to fluorescence by large molecules/ions. We detected strong diffuse interstellar bands (DIB) in the stellar spectrum, including an exceptionally strong and broad DIB at $\lambda 4428$. The detection of strong DIBs in association with ERE could be consistent with the suggestion that the carriers of DIBs and ERE are identical. The likely ERE process is recurrent fluorescence, enabled by inverse internal conversions from highly excited vibrational levels of the ground state to low-lying electronic states with subsequent transitions to ground. This provides a path to rapid radiative cooling for molecules/molecular ions, greatly enhancing their ability to survive in a strongly irradiated environment. The ratio of the equivalent widths (EW) of DIBs $\lambda 5797$ and $\lambda 5780$ in IC 63 is the same as that observed in the low-density interstellar medium with UV interstellar radiation fields (ISRF) weaker by at least two orders of magnitude. This falsifies suggestions that the ratio of these two DIBs can serve as a measure of the UV strength of the ISRF. Observations of the nebular spectrum of the PDR of IC 63 at locations immediately adjacent to where DIBs were detected failed to reveal any presence of sharp emission features seen in the spectrum of the Red Rectangle nebula. This casts doubts upon proposals that the carriers of these features are the same as those of DIBs seen at slightly shorter wavelengths.

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<https://arxiv.org/abs/2001.06431>

Photolysis-induced scrambling of PAHs as a mechanism for deuterium storage

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Aims We investigate the possible role of polycyclic aromatic hydrocarbons (PAHs) as a sink for deuterium in the interstellar medium (ISM) and study UV photolysis as a potential underlying chemical process in the variations of the deuterium fractionation in the ISM.

Methods The UV photo-induced fragmentation of various isotopologs of deuterium-enriched, protonated anthracene and phenanthrene ions (both C₁₄H₁₀ isomers) was recorded in a Fourier Transform Ion Cyclotron Resonance Mass Spectrometer (FTICR MS). Infrared multiple photon dissociation (IRMPD) spectroscopy using the Free-Electron Laser for Infrared eXperiments (FELIX) was applied to provide IR spectra. Infrared spectra calculated using density functional theory (DFT) were compared to the experimental data to identify the isomers present in the experiment. Transition-state energies and reaction rates were also calculated and related to the experimentally observed fragmentation product abundances.

Results The photofragmentation mass spectra for both UV and IRMPD photolysis only show the loss of atomic hydrogen from D-C₁₄H₁₀⁺, whereas H-C₁₄D₁₀⁺ shows a strong preference for the elimination of deuterium. Transition state calculations reveal facile 1,2-H and -D shift reactions, with associated energy barriers lower than the energy supplied by the photo-excitation process. Together with confirmation of the ground-state structures via the IR spectra, we determined that the photolytic processes of the two different PAHs are largely governed by scrambling where the H and the D atoms relocate between different peripheral C atoms. The ~0.1 eV difference in zero-point energy between C-H and C-D bonds ultimately leads to faster H scrambling than D scrambling, and increased H atom loss compared to D atom loss.

Conclusion We conclude that scrambling is common in PAH cations under UV radiation. Upon photoexcitation of deuterium-enriched PAHs, the scrambling results in a higher probability for the aliphatic D atom to migrate to a strongly bound aromatic site, protecting it from elimination. We speculate that this could lead to increased deuteration as a PAH moves towards more exposed interstellar environments. Also, large, compact PAHs with an aliphatic C-HD group on solo sites might be responsible for the majority of aliphatic C-D stretching bands seen in astronomical spectra. An accurate photochemical model of PAHs that considers deuterium scrambling is needed to study this further.

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Astron. Astrophys. (2020)

<https://www.aanda.org/component/article?access=doi&doi=10.1051/0004-6361/201936982>

Superhydrogenated Polycyclic Aromatic Hydrocarbon Molecules: Vibrational Spectra in the Infrared

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Superhydrogenated polycyclic aromatic hydrocarbons (PAHs) may be present in H-rich and ultraviolet-poor benign regions. The addition of excess H atoms to PAHs converts the aromatic bonds into aliphatic bonds, the strongest of which falls near 3.4 μm . Therefore, superhydrogenated PAHs are often hypothesized as a carrier of the 3.4 μm emission feature which typically accompanies the stronger 3.3 μm aromatic C–H stretching feature seen in various astrophysical regions. To assess this hypothesis, we use density function theory to compute the infrared (IR) vibrational spectra of superhydrogenated PAHs and their ions of various sizes (ranging from benzene, naphthalene to perylene and coronene) and of various degrees of hydrogenation. For each molecule, we derive the intrinsic oscillator strengths of the 3.3 μm aromatic C–H stretch ($A_{3.3}$) and the 3.4 μm aliphatic C–H stretch ($A_{3.4}$). By comparing the computationally-derived mean ratio of $\langle A_{3.4}/A_{3.3} \rangle \approx 1.98$ with the mean ratio of the observed intensities $\langle I_{3.4}/I_{3.3} \rangle \approx 0.12$, we find that the degree of superhydrogenation — the fraction of carbon atoms attached with extra hydrogen atoms — is only $\sim 2.2\%$ for neutral PAHs which predominantly emit the 3.3 and 3.4 μm features. We also determine for each molecule the intrinsic band strengths of the 6.2 μm aromatic C–C stretch ($A_{6.2}$) and the 6.85 μm aliphatic C–H deformation ($A_{6.85}$). We derive the degree of superhydrogenation from the mean ratio of the observed intensities $\langle I_{6.85}/I_{6.2} \rangle \lesssim 0.10$ and $\langle A_{6.85}/A_{6.2} \rangle \approx 1.53$ for neutrals and $\langle A_{6.85}/A_{6.2} \rangle \approx 0.56$ for cations to be $\lesssim 3.1\%$ for neutrals and $\lesssim 8.6\%$ for cations. We conclude that astrophysical PAHs are primarily aromatic and are only marginally superhydrogenated.

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Accepted for publication in ApJS

<http://arxiv.org/abs/2001.00717>

Learning mid-IR emission spectra of polycyclic aromatic hydrocarbon populations from observations

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The James Webb Space Telescope (JWST) will deliver large data sets of high-quality spectral data over the 0.6–28 μm range. It will combine sensitivity, spectral and spatial resolution. Specific tools are required to provide efficient scientific analysis of such large data sets. Our aim is to illustrate the potential of unsupervised learning methods to get insights into chemical variations in the populations that carry the aromatic infrared bands (AIBs), more specifically PAH species and carbonaceous very small grains (VSGs). We

present a method based on linear fitting and blind signal separation (BSS) for extracting representative spectra for a spectral data set. The method is fast and robust, which ensures its applicability to JWST spectral cubes. We tested this method on a sample of ISO-SWS data, which resemble most closely the JWST spectra in terms of spectral resolution and coverage. Four representative spectra were extracted. Their main characteristics appear consistent with previous studies with populations dominated by cationic PAHs, neutral PAHs, evaporating VSGs, and large ionized PAHs, known as the PAHx population. In addition, the $3\ \mu\text{m}$ range, which is considered here for the first time in a BSS method, reveals the presence of aliphatics connected to neutral PAHs. Each representative spectrum is found to carry second-order spectral signatures (e.g. small bands), which are connected with the underlying chemical diversity of populations. However, the precise attribution of these signatures remains limited by the combined small size and heterogeneity of the sample of astronomical spectra available in this study. The upcoming JWST data will allow us to overcome this limitation. The large data sets of hyperspectral images provided by JWST analysed with the proposed method, which is fast and robust, will open promising perspectives for our understanding of the chemical evolution of the AIB carriers.

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A&A 632, A84 (2019)

<https://arxiv.org/abs/1910.10450>

Superhydrogenation of pentacene: the reactivity of zigzag-edges

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Investigating the hydrogenation of carbonaceous materials is of interest in a wide range of research areas including electronic device development, hydrogen storage, and, in particular, astrocatalytic formation of molecular hydrogen in the universe. Polycyclic Aromatic Hydrocarbons (PAHs) are ubiquitous in space, locking up close to 15% of the elementary carbon. We have used thermal desorption measurements to study the hydrogenation sequence of pentacene from adding one additional H to the fully hydrogenated pentacene species. The experiments reveal that hydrogenated species with an even number of excess H atoms are highly preferred over hydrogenated species with an odd number of H atoms. In addition, the experiments show that specific hydrogenation states of pentacene with 2, 4, 6, 10, 16 and 22 extra H atoms are preferred over other even numbers. We have investigated the structural stability and activation energy barriers for the superhydrogenation of pentacene using Density Functional Theory. The results reveal a preferential hydrogenation pattern set by the activation energy barriers of the hydrogenation steps. Based on these studies, we formulate simple concepts governing the hydrogenation that apply equally well for different PAHs.

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Phys. Chem. Chem. Phys.

<https://doi.org/10.1039/C9CP05440E>

<https://pubs.rsc.org/en/content/articlelanding/2020/CP/C9CP05440E#!divAbstract>

Residue from vacuum ultraviolet irradiation of benzene ices: Insights into the physical structure of astrophysical dust

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We have irradiated benzene ices deposited at 4 K on a cold, interstellar dust analog with vacuum ultraviolet (9 eV) irradiation for periods lasting from several hours to nearly a day, after which the irradiated ice was warmed to room temperature. Vacuum ultraviolet photoabsorption spectra of the aromatic residue left at room temperature were recorded and showed the synthesis of benzene derivatives. The residue was also imaged using an electron microscope and revealed crystals of various sizes and shapes. The result of our experiments suggest such geometrically shaped dust particles may be a key component of interstellar dust.

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Spectrochimica Acta Part A - Molecular and Biomolecular spectroscopy

<https://doi.org/10.1016/j.saa.2019.117797>

How Alkali Cations Catalyze Aromatic Diels-Alder Reactions

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We have quantum chemically studied alkali cation-catalyzed aromatic Diels-Alder reactions between benzene and acetylene forming barrelene using relativistic, dispersion-

corrected density functional theory. The alkali cation-catalyzed aromatic Diels-Alder reactions are accelerated by up to 5 orders of magnitude relative to the uncatalyzed reaction and the reaction barrier increases along the series $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+ < \text{none}$. Our detailed activation strain and molecular-orbital bonding analyses reveal that the alkali cations lower the aromatic Diels-Alder reaction barrier by reducing the Pauli repulsion between the closed-shell filled orbitals of the dienophile and the aromatic diene. We argue that such Pauli mechanism behind Lewis-acid catalysis is a more general phenomenon. Also, our results may be of direct importance for a more complete understanding of the network of competing mechanisms towards the formation of polycyclic aromatic hydrocarbons (PAHs) in an astrochemical context.

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<https://onlinelibrary.wiley.com/doi/abs/10.1002/asia.202000009>

<https://onlinelibrary.wiley.com/doi/epdf/10.1002/asia.202000009>

On Carbon Nanotubes in the Interstellar Medium

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Since their discovery in 1991, carbon nanotubes (CNTs) — a novel one-dimensional carbon allotrope — have attracted considerable interest worldwide because of their potential technological applications such as electric and optical devices. In the astrophysical context, CNTs may be present in the interstellar space since many of the other allotropes of carbon (e.g., amorphous carbon, fullerenes, nanodiamonds, graphite, polycyclic aromatic hydrocarbons, and possibly graphene as well) are known to be widespread in the Universe, as revealed by presolar grains in carbonaceous primitive meteorites and/or by their fingerprint spectral features in astronomical spectra. In addition, there are also experimental and theoretical pathways to the formation of CNTs in the interstellar medium (ISM). In this work, we examine their possible presence in the ISM by comparing the observed interstellar extinction curve with the ultraviolet/optical absorption spectra experimentally obtained for single-walled CNTs of a wide range of diameters and chiralities. Based on the absence in the interstellar extinction curve of the ~ 4.5 and 5.25 eV π -plasmon absorption bands which are pronounced in the experimental spectra of CNTs, we place an upper limit of ~ 10 ppm of C/H (i.e., $\sim 4\%$ of the total interstellar C) on the interstellar CNT abundance.

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Accepted for publication in MNRAS

<http://arxiv.org/abs/2002.05588>



Meetings

4th Summer School of Physics of the Southern Edge Polycyclic Aromatic Hydrocarbons (PAHs) in the Universe

**May 4-8, 2020
Rio Grande, Brazil**

The Institute of Mathematics, Statistics and Physics (Instituto de Matemática, Estatística e Física -IMEF) of the Federal University of Rio Grande (Universidade Federal do Rio Grande -FURG) invites young post-doc researchers and master/PhD students to the 4th Summer School of Physics of the Southern Edge (*4a Escola de Física do Extremo Sul - EFESUL*) that will be held on May 4-8, 2020 at the FURG campus in the city of Rio Grande in the state of Rio Grande do Sul, Brazil.

The 4th EFESUL is focused on the specific topic of "Polycyclic Aromatic Hydrocarbons (PAHs) in the Universe". EFESUL has the objective to introduce the future generation of young astronomers to the forefront of the theoretical, observational, experimental and modeling developments on Polycyclic Aromatic Hydrocarbons (PAH). During its one week summer school participants will benefit from a balanced programme that includes both a series of structured daily lectures (morning sessions) and hands-on exercises (afternoon sessions). Moreover, a number of short presentations will be given by other invited local speakers covering various topics related to PAHs and molecules in general.

Invited speakers:

Alexander Tielens (Leiden Observatory, Leiden University, Netherlands)

Diana Andrade (Observatório do Valongo, Universidade Federal do Rio de Janeiro, Brazil)

Isabel Aleman (Instituto de Física e Química, Universidade Federal de Itajubá, Brazil)

Carla Canelo (Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, Brazil)

Jacques Lépine (Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, Brazil)

Paul G. Kinas (Instituto de Matemática, Estatística e Física, Universidade Federal do Rio Grande, Brazil)

Karin Menéndez-Delmestre (Observatório do Valongo, Universidade Federal do Rio de Janeiro, Brazil)

Eligibility:

Post-doctoral researchers, as well as PhD, Master degree, and graduate students of Physics or Astrophysics are eligible to apply. Undergraduate students are also welcome to apply. Priority will be given to applicants from South America.

How to apply:

Interested candidates should send their application no later than March 23rd, 2020 to the following e-mail address: **furg.efesul@gmail.com**

Applications will be reviewed shortly after and candidates will be notified by March 30th, 2020.

There is no registration fee for the 4th EFESUL summer school participants. Accommodation will be provided without charges for all participants in the campus of the Federal University of Rio Grande (for more information write to the following e-mail address: **furg.efesul@gmail.com**).

Additionally, all participants will be provided with a special discount for breakfast, lunch and dinner exclusively for the on-campus restaurant. No travel expenses will be covered.

For further information, please refer to the website of the EFESUL:

<https://furgefesul.wixsite>

and Facebook page:

<https://www.facebook.com/furg>

Important dates:

Open application: February 1st , 2019

Deadline for application: March 23rd , 2020

Notification of acceptance: March 30th , 2020

Summer School: May 4-8, 2020

Local Organizing Committee:

Dinalva Sales,
Stavros Akras,
Matheus Lazo,
Yan Soares,
Brenda Matoso

Scientific Organizing Committee:

Dinalva Sales,
Stavros Akras,
Matheus Lazo

The lifecycle of cosmic PAHs

Aarhus University, Denmark
15 -19 June 2020

Abstract submission
deadline 20 February 2020

Invited speakers include

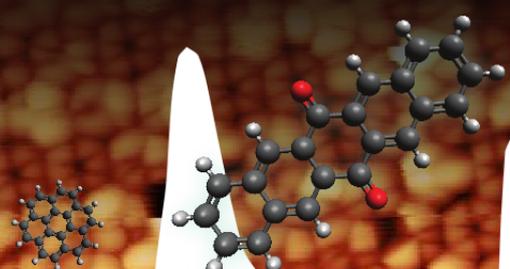
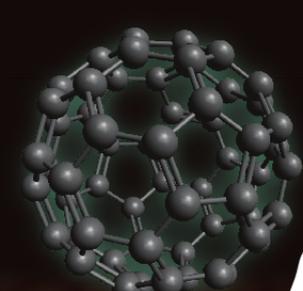
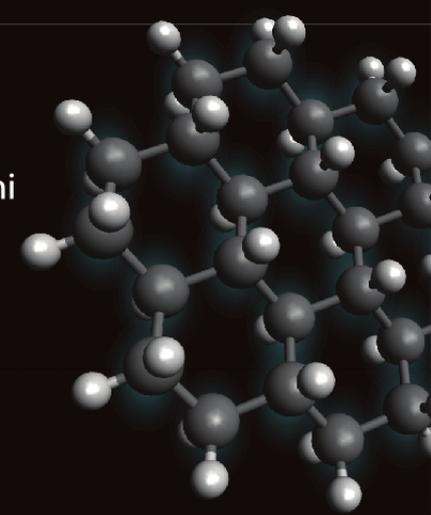
Kathrin Altwegg, University of Bern
José Ángel Martín Gago, CSIC
Partha P. Bera, NASA Ames Research Center
Christiaan Boersma, NASA Ames Research Center
Jordy Bouwman, Leiden University
Sandra Brünken, Radboud University
Wybren Jan Buma, Universiteit van Amsterdam
Jan Cami, University of Western Ontario
Ewen K. Campbell, University of Edinburgh
Jeremy Chastenet, University of California San Diego
Francois Dulieu, Université de Cergy-Pontoise
Michael Duncan, University of Georgia
M. Samy El-Shall, Virginia Commonwealth University
Javier R. Goicoechea, CSIC
Christine Joblin, Université Toulouse III - Paul Sabatier
Rocco Martinazzo, Università degli Studi di Milano
Stefanie N. Milam, NASA Goddard Space Flight Center
Giacomo Mulas, INAF
Jos Oomens, Radboud University
Melanie Schnell, Christian-Albrechts-Universität zu Kiel
Henning Zettergren, Stockholm University

Session Topics

PAH formation and destruction
PAH spectroscopy from lab to space
The relationship of PAHs, fullerenes and dust
PAHs and interstellar chemistry
PAHs and the solar system

Scientific Organising Committee

Olivier Berné
Alessandra Candian
Liv Hornekær
Els Peeters
Annemieke Petrignani
Xander Tielens



For more information
conferences.au.dk/cosmicpah2020/
cosmicPAH@phys.au.dk
Horsehead Nebula Image Copyright Robert Gendler 2016



EAS 2020 SS11

“The Molecular Journey from Stars to Disks”

29 June 2020

Convention Center Holiday Inn, Leiden, The Netherlands

The Special Session “The molecular journey: from stars to disk (and exoplanets)” will take place on June 29, 2020 at the EAS 2020 Annual Meeting in Leiden (NL).

AIM & SCOPE

In this special session we will focus on the study of molecules and their isotopologues and what they can teach us about the journey of molecules in our Galaxy. The scope is to bring the community together to showcase molecular insights in the evolution of matter from old stars to the ISM and into newly formed planets, to highlight recent advances in molecular astrophysics, to design strategies to best exploit the new astronomical facilities, and to provide fertile ground for future, interdisciplinary collaborations.

More information and registration through the EAS 2020 [website](#)

Deadline for abstract submissions (talk and poster) is **March 2, 2020**.

INVITED SPEAKERS

- Leen Decin (KULeuven, Belgium)
- Paola Caselli (MPIE, Germany)
- Catherine Walsh (University of Leeds, UK)

SOC

- Alessandra Candian (UvA)
- Annemieke Petrignani (UvA)
- Marie Van de Sande (KULeuven)
- Serena Viti (UCL/Leiden)
- Tom Millar (QUB)
- Francesco Fontani (INAF)

E-mail for contact: a.candian@uva.nl

Webpage: https://eas.unige.ch/EAS_meeting/session.jsp?id=SS11



Announcements

PhD position Molecular Physics / Physical Chemistry / Laboratory Astrophysics

Advertised by Prof. Dr. Otto Dopfer

A **PhD position (3 years)**, fully funded by the German Science Foundation (DFG), is available in the **laser molecular spectroscopy group of Otto Dopfer at Technische Universität Berlin, Germany**. This project deals with the spectroscopic and quantum chemical characterization of the geometric, electronic, optical and chemical properties of silicon- and carbon-bearing molecules and clusters in the context of dust formation in the interstellar medium.

Application deadline: March 15, 2020.

Contact: Prof. Dr. Otto Dopfer

E-mail: dopfer@physik.tu-berlin.de

[PhD_position_Dopfer](#)

AstroPAH Newsletter

<http://astropah-news.strw.leidenuniv.nl>
astropah@strw.leidenuniv.nl

Next issue: 21 March 2020
Submission deadline: 8 March 2020