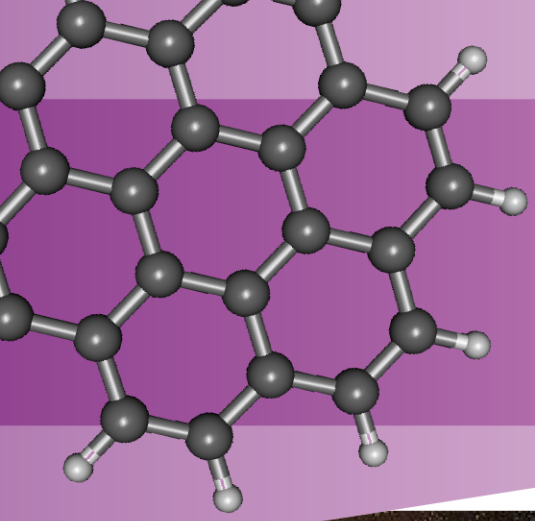

AstroPAH

A Newsletter on Astronomical PAHs

Issue 45 | Feb 2018

The 1st Ring

Editorial

Dear Colleagues,

After our break in January, we welcome you to the first AstroPAH of 2018. Instead of Starman in a Tesla with Earth in the background, we have another exciting Picture of the Month featured on the cover for you: the detection of a specific interstellar aromatic molecule, benzonitrile, the first to be measured through its radio spectrum.

In Focus we have a must read: an interview with Prof. Harold Linnartz from the Leiden Observatory, a renowned researcher in the field of Laboratory Astrophysics, giving a behind the scenes and some good or rather ”worst“ advice.

The abstracts section this month is quite full with the abstracts of 10 papers on a variety of topics, amongst which the detection of benzonitrile and many studies of PAH related species. Also find the AAS LAD, NASA LAW and Copenhagen Dust conferences in our Meeting section. Finally, two postdoctoral vacancies at the Open University (UK) are present in our Announcement section.

As usual, we encourage you to send your contributions anytime. For publication in the next AstroPAH, see the deadlines below. We are looking forward to many nice contributions and thank you all for your input and interest from last year.

The Editorial Team

Next issue: 22 March 2018.
Submission deadline: 9 March 2018.

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PAH Picture of the Month

A wide-field view of part of the Taurus Molecular Cloud (TMC-1). Many dark clouds of obscuring dust are clearly visible against the background stars. In one of this dark cloud Brett McGuire et al. (see the Abstract section) detected the rotational emission from benzonitrile (C_6H_5CN), the first ring molecule to be detected in the radio regime.

Credits: Figure composition by Alessandra Candian. DSS2 (Background)

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

Interview with Harold Linnartz

Tell us about yourself.

I grew up in the very southern part of the Netherlands, an area known (at that time) for its coal mines. After my Gymnasium β[1], I studied experimental physics at the University of Nijmegen. Here I also performed my PhD, in the Department for Molecule and Laser Physics, studying van der Waals complexes and molecular ions in the far infrared. After my defense (1994) I spent one year as postdoc in Bonn and nearly seven years in Basel, where I completed my habilitation in phyiscal chemistry on carbon chain radicals of astrophysical relevance in 2002. After a short stay at the Laser Center in Amsterdam, I moved to Leiden. Since 2005 I have been the director of the Sackler Laboratory for Astrophysics, and since 2012 I have held the chair for Laboratory Astrophysics.

Can you tell us about the ongoing research at the Sackler Laboratory for Astrophysics?

In the SLA we use physical techniques to address chemical questions of astronomical interest. For this we have designed and constructed 8 different setups. Three experiments focus on gas phase studies, recording high resolution spectra of molecular transients (such as the smallest aromatic molecule cyclic-$C_3H_3^+$), searching for possible diffuse interstellar band carriers or investigating the photo-dissociation behavior of PAHs. Our 'ice setups' record electronic and vibrational spectra of interstellar ice analogues and quantitatively characterize the dynamical

[1] 6 yrs classic pre-university education focusing on natural sciences.

processes at play upon vacuum UV irradiation and atom bombardment. In the recent past, we have derived the full solid state formation scheme of interstellar water. More recently we have started to investigate how so called COMs, complex organic molecules like ethylene glycol and glycerol, can be formed in solid state reactions. A special focus has been and still is on those molecules that are needed as a starting point to construct the building blocks of life. In parallel we study the photo-chemistry of PAHs and other large species embedded in interstellar ice environments.

The SLA is fully embedded within Leiden Observatory, and this makes it so that data recorded in the lab find their way quickly to observational programs. Daily interactions with astronomers guarantee that experiments address timely questions. Ideally, we can provide specific input to guide or help interpret observational data, such as through the Leiden Database for Ice that forms one of the pillars of 'Ice Age', an Early Release Science program with JWST. The experimental results are also needed for astrochemical models, to bridge the short timescales typical for lab studies to the elongated timescales in space, and to chemically link the separate snapshots that are provided by observational studies, starting with diffuse and dense interstellar clouds, through proto-planetary disks and planetary systems, and ending with the ejecta of dying stars. As the lab data are recorded under fully controlled conditions, it is also possible to understand the involved physical and chemical processes, which allows us to use observational data as diagnostic tools. The SLA provides the data to characterize the 'what and where' in molecular astrochemistry, and similarly addresses the 'why here and how did it get there'.

Have a look at our homepage: www.laboratory-astrophysics.eu

What is the best advice you received?

I will tell you the worst advice I received, because this was a real eye opener as well. About 15 years ago, when I had just returned to the Netherlands after my habitation in Switzerland, I had a chat with a dean about my scientific future. This chat coincided with a major faculty reorganization. As my funding was taken care of externally, this did not affect me directly, but it positioned many of my plans into an instant and permanent standby modus. This dean told me: "Harold, I clearly see perspective for you behind the horizon." I decided to quit, and three months later I started in Leiden. When you have nothing to offer, don't make promises.

What is your advice for young researchers entering in the lab astro field now?

Work with state-of-the-art equipment, realize that the equipment is only a tool and never the goal, address important (astronomical) questions, network, and write an observing proposal yourself. You will notice that lab astro is not the only tough part in identifying molecules in space.

What are the current greatest challenges/achievements in lab astro?

Many labs all over the world provide great data that improve our understanding of the processes taking place in space. Lab programs support space missions and data bases that are needed to fully benefit from the scientific impact of astronomical observations. And still, lab astro remains a scattered research field. Research relevant for large projects is often performed on soft money and without too much coordination. It would be great if this situation would improve. Three years ago we tried to start a European Lab Astro User Facility, in order to coordinate access to unique but scattered research opportunities all over Europe. The concept is very comparable to the procedure to get observing time at a telescope; you apply for measurement time on one of the involved instruments, and if successful, access and support for travel and accommodation is granted. In turn, the hosting lab gets financial support to run and upgrade their infrastructure. We were not successful, unfortunately. However, at a national level more and more networks have become active, merging the expertise of astronomers, lab astrophysicists and astrochemical modelers. A good example is the Dutch Astrochemistry Network. We started last year with the second 4 year episode of this success story, and now we have some 12 PhD students and postdocs working in gas phase, solid state and PAH related research topics.

But of course, you did not want to hear about the political issues ... the big scientific challenge lab astro faces, in my opinion, in my research field, is to understand how the chemical processes in molecular clouds ultimately affect the composition of (exo)planets. When we show that glycine, the smallest amino acid, is produced on interstellar grains, is this relevant for the origin of life? When we have measured the thermal and photo-induced desorption rates of frozen molecules, does this help to understand how (exo)planetary atmospheres will look? We are looking at an immense puzzle, and lab astro has much potential to put many pieces in their place.

How do you balance your professional and personal life, and what struggles did you have to face while pursuing your professional career (two body problem...)?

I met my wife in the lab, so balancing professional and personal life was not that hard in the beginning. This was the case until I was offered a position in Basel and she still had to finish her PhD in Bonn, with regular and long research stays in Oxford and Boulder. Well, let's say it in this way: we have spent a lot of money on traveling and as Skype and Facetime did not exist yet, on phone-calls. After her Phd, my wife decided to go for an industrial career and we were lucky that when we moved to the Netherlands she was offered a job in the Dutch subsidiary of her company. Moreover, we soon had to face a 3-body and also a 4-body problem, and the extra boundary conditions this introduced in our life made things very simple - you work to live, you don't live to work - but not necessarily easier; we regularly play a round of 'Agenda Sudoku'. We plan far ahead.

Abstracts

Global photometric analysis of galactic HII regions

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Total infrared fluxes are estimated for 99 HII regions around massive stars. The following wavebands have been used for the analysis: 8 and 24 μm, based on data from Spitzer space telescope (IRAC and MIPS, respectively); 70, 160, 250, 350, and 500 µm, based on data from Herschel Space Observatory (PACS and SPIRE). The estimated fluxes are used to evaluate the mass fraction of polycyclic aromatic hydrocarbons ($q_{\rm PAH}$) and the intensity of the ultraviolet emission in the studied objects. It is shown that the PAH mass fraction, $q_{\rm PAH}$, is much lower in these objects than the average Galactic value, implying effective destruction of aromatic particles in HII regions. Estimated radiation field intensities (U) are close to those derived for extragalactic HII complexes. Color indices [F_{24}/F_8], [F_{70}/F_{24}], [F_{160}/F_{24}], [F_{160}/F_{70}] are compared to criteria proposed to distinguish between regions of ionized hydrogen and planetary nebulae. Also, we relate our results to analogous color indices for extragalactic complexes of ionized hydrogen.

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Unbiased large spectroscopic surveys of galaxies selected by SPICA using dust bands

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The mid-infrared (IR) range contains many spectral features associated with large molecules and dust grains such as polycyclic aromatic hydrocarbons (PAHs) and silicates. These are usually very strong compared to fine-structure gas lines, and thus valuable in studying the spectral properties of faint distant galaxies. In this paper, we evaluate the capability of low-

resolution mid-IR spectroscopic surveys of galaxies that could be performed by SPICA. The surveys are designed to address the question how star formation and black hole accretion activities evolved over cosmic time through spectral diagnostics of the physical conditions of the interstellar/circumnuclear media in galaxies. On the basis of results obtained with *Herschel* far-IR photometric surveys of distant galaxies and *Spitzer* and AKARI near- to mid-IR spectroscopic observations of nearby galaxies, we estimate the numbers of the galaxies at redshift $z > 0.5$, which are expected to be detected in the PAH features or dust continuum by a wide (10 deg^2) or deep (1 deg^2) blind survey, both for a given observation time of 600 hours. As by-products of the wide blind survey, we also expect to detect debris disks, through the mid-IR excess above the photospheric emission of nearby main-sequence stars, and we estimate their number. We demonstrate that the SPICA mid-IR surveys will efficiently provide us with unprecedentedly large spectral samples, which can be studied further in the far-IR with SPICA.

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https://www.cambridge.org/core/services/aop-cambridge-core/content/view/S132335801700056X

GTC/CANARICAM MID-IR IMAGING OF THE FULLERENE-RICH PLANETARY NEBULA IC 418: searching for the spatial distribution of fullerene-like molecules

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We present seeing-limited narrow-band mid-IR GTC/CanariCam images of the spatially extended fullerene-containing planetary nebula (PN) IC 418. The narrow-band images cover the C_{60} fullerene band at 17.4 µm, the polycyclic aromatic hydrocarbon like (PAH-like) feature at 11.3 µm, the broad 9-13 µm feature, and their adjacent continua at 9.8 and 20.5 µm. We study the relative spatial distribution of these complex species, all detected in the *Spitzer* and *Infrared Space Observatory (ISO)* spectra of IC 418, with the aim of getting observational constraints to the formation process of fullerenes in H-rich circumstellar environments. A similar ring-like extended structure is seen in all narrow-band filters, except in the dust continuum emission at 9.8 µm, which peaks closer to the central star. The continuum-subtracted images display a clear ring-like extended structure for the carrier of the broad 9-13 µm emission, while the spatial distribution of the (PAH-like) 11.3 µm emission is not so well defined. Interestingly, a residual

C_{60} 17.4 µm emission (at about 4-σ from the sky background) is seen when subtracting the dust continuum emission at 20.5 µm. This residual C_{60} emission, if real, might have several interpretations; the most exciting being perhaps that other fullerene-based species like hydrogenated fullerenes with very low H-content may contribute to the observed 17.4 µm emission. We conclude that higher sensitivity mid-IR images and spatially resolved spectroscopic observations (especially in the Q-band) are necessary to get some clues about fullerene formation in PNe.

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Probing the baryon cycle of galaxies with SPICA mid- and far-infrared observations

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The SPICA mid and far-infrared telescope will address fundamental issues in our understanding of star formation and ISM physics in galaxies. A particular hallmark of SPICA is the outstanding sensitivity enabled by the cold telescope, optimized detectors, and wide instantaneous bandwidth throughout the mid- and far-infrared. The spectroscopic, imaging and polarimetric observations that SPICA will be able to collect will help in clarifying the complex physical mechanisms which underlie the baryon cycle of galaxies. In particular: (i) The access to a large suite of atomic and ionic fine-structure lines for large samples of galaxies will shed light on the origin of the observed spread in star formation rates within and between galaxies. (ii) Observations of HD rotational lines (out to ∼10 Mpc) and fine structure lines such as [C II] 158 µm (out to ∼100 Mpc) will clarify the main reservoirs of interstellar matter in galaxies, including phases where CO does not emit. (iii) Far-infrared spectroscopy of dust and ice features will address uncertainties in the mass and composition of dust in galaxies, and the contributions of supernovae to the interstellar dust budget will be quantified by photometry and monitoring of supernova remnants in nearby galaxies. (iv) Observations of far-infrared cooling lines such as [O I] 63 µm from star-forming molecular clouds in our Galaxy will evaluate the importance of shocks to dissipate turbulent energy. The paper concludes with requirements for the telescope and instruments, and recommendations for the observing strategy.

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High-resolution IR absorption spectroscopy of polycyclic aromatic hydrocarbons in the 3 µm region: role of hydrogenation and alkylation

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Aim. We aim to elucidate the spectral changes in the 3 µm region that result from chemical changes in the molecular periphery of polycyclic aromatic hydrocarbons (PAHs) with extra hydrogens (H-PAHs) and methyl groups (Me-PAHs).
Methods. Advanced laser spectroscopic techniques combined with mass spectrometry were applied on supersonically cooled 1,2,3,4-tetrahydronaphthalene, 9,10-dihydroanthracene, 9,10-

dihydrophenathrene, 1,2,3,6,7,8-hexahydropyrene, 9-methylanthracene, and 9,10-dimethylanthracene, allowing us to record mass-selective and conformationally selective absorption spectra of the aromatic, aliphatic, and alkyl CH-stretches in the 3.175-3.636 μm region with laser-limited resolution. We compared the experimental absorption spectra with standard harmonic calculations and with second-order vibrational perturbation theory anharmonic calculations that use the SPECTRO program for treating resonances.
Results. We show that anharmonicity plays an important if not dominant role,affecting not only aromatic, but also aliphatic and alkyl CH-stretch vibrations. The experimental high-resolution data lead to the conclusion that the variation in Me- and H-PAHs composition might well account for the observed variations in the 3 μm emission spectra of carbon-rich and star-forming regions. Our laboratory studies also suggest that heavily hydrogenated PAHs form a significant fraction of the carriers of IR emission in regions in which an anomalously strong 3 μm plateau is observed.

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EDIBLES II. On the detectability of C_{60}^+ bands

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Gas phase spectroscopic laboratory experiments for the buckminsterfullerene cation C_{60}^+ resulted in accurate rest wavelengths for five C_{60}^+ transitions that have been compared with diffuse interstellar bands (DIBs) in the near infra-red. Detecting these in astronomical spectra is difficult due to the strong contamination of ground-based spectra by atmospheric water vapor, to the presence of weak and shallow stellar lines and/or blending with other weak DIBs. The detection of the two strong bands has been claimed by several teams, and the three additional and weaker bands have been detected in a few sources. Certain recent papers have argued against the identification of C_{60}^+ based on spectral analyses claiming (i) a large variation in the

ratio between the equivalent widths of the 9632 and 9577 Å bands, (ii) a large redshift of the 9632 Å band for the Orion star HD 37022, and (iii) the non-detection of the weaker 9428 Å DIB. Here we address these three points. (i) We show that the model stellar line correction for the 9632 Å DIB overestimates the difference between the strengths of the lines in giant and dwarf star spectra, casting doubts on the conclusions about the ratio variability. (ii) Using high-quality stellar spectra recorded with the ESO/Paranal Ultraviolet Echelle Spectrograph (UVES) in about the same atmospheric conditions, we find no wavelength shift in the 9632 Å band towards HD 37022. (iii) Using UVES EDIBLES spectra and data from the Echelle SpectroPolarimetric Device for the Observation of Stars (ESPaDOnS) at CFHT we show that the presence of a weak 9428 Å band cannot be ruled out, even in the same observations that a previous study claimed it was not present.

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From planes to bowls: Photodissociation of the bisanthenequinone cation

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We present a combined experimental and theoretical study of the photodissociation of the bisanthenequinone ($C_{28}H_{12}O_2$) cation, Bq^+. The experiments show that, upon photolysis, the Bq^+ cation does not dehydrogenate, but instead fragments through the sequential loss of the two neutral carbonyl groups, causing the formation of five-membered carbon cycles. Quantum chemical calculations confirm this $Bq^+ \rightarrow [Bq - CO]^+ \rightarrow [Bq - 2CO]^+$ sequence as the energetically most favorable reaction pathway. For the first CO loss, a transition state with a barrier of 3.2 eV is found, substantially lower than the lowest calculated H loss dissociation pathway (4.9 eV). A similar situation applies for the second CO loss channel (3.8 eV vs. 4.7 eV), but where the first dissociation step does not strongly alter the planar PAH geometry, the second step transforms the molecule into a bowl-shaped one.

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Detection of the Aromatic Molecule Benzonitrile (c-C_6H_5CN) in the Interstellar Medium

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Polycyclic aromatic hydrocarbons and polycyclic aromatic nitrogen heterocycles are thought to be widespread throughout the Universe, because these classes of molecules are probably responsible for the unidentified infrared bands, a set of emission features seen in numerous Galactic and extragalactic sources. Despite their expected ubiquity, astronomical identification of specific aromatic molecules has proven elusive. We present the discovery of benzonitrile (c-C_6H_5CN), one of the simplest nitrogen-bearing aromatic molecules, in the interstellar medium. We observed hyperfine-resolved transitions of benzonitrile in emission from the molecular cloud TMC-1. Simple aromatic molecules such as benzonitrile may be precursors for polycyclic aromatic hydrocarbon formation, providing a chemical link to the carriers of the unidentified infrared bands.

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http://science.sciencemag.org/content/359/6372/202
https://arxiv.org/abs/1801.04228

Laboratory Gas-phase Infrared Spectra of Two Astronomically Relevant PAH Cations: Diindenoperylene, $C_{32}H_{16}^+$ and Dicoronylene, $C_{48}H_{20}^+$

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The first gas-phase infrared spectra of two isolated astronomically relevant and large polycyclic aromatic hydrocarbon (PAH) cations – diindenoperylene (DIP) and dicoronylene (DC) – in the 5301800 cm^{-1} (18.9-5.6 µm) range – are presented. Vibrational band positions are determined for comparison to the aromatic infrared bands. The spectra are obtained via infrared multiphoton dissociation spectroscopy of ions stored in a quadrupole ion trap using the intense and tunable radiation of the free electron laser for infrared experiments (FELIX). DIP^+ shows its main absorption peaks at 737 (13.57), 800 (12.50), 1001 (9.99), 1070 (9.35), 1115 (8.97), 1152 (8.68), 1278 (7.83), 1420 (7.04), and 1550 (6.45) cm^{-1} (µm), in good agreement with density functional theory (DFT) calculations that are uniformly scaled to take anharmonicities into account. DC^+ has its main absorption peaks at 853 (11.72), 876 (11.42), 1032 (9.69), 1168 (8.56), 1300 (7.69), 1427 (7.01), and 1566 (6.39) cm^{-1} (µm), which also agree well with the scaled DFT results presented here. The DIP^+ and DC^+ spectra are compared with the prominent infrared features observed toward NGC 7023. This results both in matches and clear deviations. Moreover, in the 11.0-14.0 µm region, specific bands can be linked to CH out-of-plane (oop) bending modes of different CH edge structures in large PAHs. The molecular origin of these findings and their astronomical relevance are discussed.

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http://iopscience.iop.org/article/10.3847/1538-4357/aaa7f2/meta

Variations in the 6.2 µm emission profile in starburst-dominated galaxies: a signature of polycyclic aromatic nitrogen heterocycles (PANHs)?

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Analyses of the polycyclic aromatic hydrocarbon (PAH) feature profiles, especially the 6.2 µm feature, could indicate the presence of nitrogen incorporated in their aromatic rings. In this work, 155 predominantly starburst-dominated galaxies (including HII regions and Seyferts, for example), extracted from the Spitzer/Infrared Spectrograph ATLAS project, have their 6.2 µm profiles fitted allowing their separation into the Peeters A, B, and C classes. 67% of these galaxies were classified as class A, 31% were as class B, and 2% as class C. Currently, class A sources, corresponding to a central wavelength near 6.22 µm, seem only to be explained by polycyclic aromatic nitrogen heterocycles (PANHs), whereas class B may represent a mix between PAHs and PANHs emissions or different PANH structures or ionization states. Therefore, these spectra suggest a significant presence of PANHs in the interstellar medium (ISM) of

these galaxies that could be related to their starburst-dominated emission. These results also suggest that PANHs constitute another reservoir of nitrogen in the Universe, in addition to the nitrogen in the gas phase and ices of the ISM.

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MNRAS, 475, 3746 (2018)
https://academic.oup.com/mnras/article-abstract/475/3/3746/4788796?redirectedFrom=fulltext

2018 Meeting of the Laboratory Astrophysics Division of the AAS

Sheraton Denver Downtown Hotel, Denver, CO, USA

3-7 June 2018

The Laboratory Astrophysics Division (LAD) meeting will be held with the 232th American Astronomical Society meeting. LAD sessions will occur from Monday June 4th and end with a morning session on Thursday June 7th. There will also be a LAD plenary talk on Tuesday morning by Prof. David Neufeld of Johns Hopkins University overviewing the exciting results obtained by the Herschel Space Observatory with a focus on the importance of laboratory astrophysics to our evolving understanding of the interstellar medium.

Important Deadlines:

- Hotel: 10 May 2018
- Registration: 26 Feb 2018
- Abstracts: available soon

Session topics & confirmed invited speakers to date include:

- From Data to Models: Jonas Lippuner (CalTech) and Simon Glover (Univ. of Heidelberg)
- Disks and Circumstellar Outflows in the ALMA Era: Sabrina Gaertner (Open Univ.) and Jeremy Goodman (Princeton)
- Plasma Processes in the X-ray and Beyond: Hiroya Yamaguchi (NASA GSFC) and Duane Liedahl (LLNL)
- Disks and Circumstellar Outflows in the JWST Era: Uma Gorti (NASA ARC/SETI), Jiao He (Syracuse Univ.), and Timothy Lee (NASA ARC)
- Mega-Lab Studies of Astro-micro-physics: Jose Crespo Lopez-Urrutia (MPI for Nuclear Physics) and Hendrik Schatz (Michigan State Univ.)

- Cassini's view on the Chemistry of the Saturn System: Veronique Vuitton (CNRS/Univ. Grenoble) and Delphine Nna-Mvondo (NASA GSFC)
- Neutron Star Mergers and the r-Process: Jennifer Barnes (Columbia Univ.), Rebecca Surman (Univ. Notre Dame), and Aimee Hungerford (LANL).

This will also be your chance to meet, hear, and congratulate the LAD prize winners for 2018: Prof. Michael Wiescher (LAD Prize) and Dr. Clayton Myers (LAD Dissertation Prize).

There will be a LAD Business Meeting Tuesday evening after the poster session. Refreshments will be available! Room has been left in the schedule for some contributed talks and of course, we invite everyone to submit posters. So please plan to attend and present your latest results at what will be one of top meetings for Laboratory Astrophysics in 2018!

LAD Program Committee:
Crystal Brogan (National Radio Astronomy Observatory), Jan Cami (University of Western Ontario), Roberto Mancini (University of Nevada), Stefanie Milam (NASA GSFC), John Raymond (SAO), Farid Salama (NASA Ames, Past Chair), Daniel Wolf Savin (Columbia University), Ella Sciamma-O'Brien (BAERI, NASA Ames) Oswald Siegmund (UC Berkeley), Randall Smith (Smithsonian Astrophysical Observatory, Chair), Artemis Spyrou (Michigan State University), and Phillip Stancil (University of Georgia, Vice Chair).

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Webpage: https://aas.org/meetings/aas232

2018 NASA Laboratory Astrophysics Workshop

University of Georgia, Athens, GA, USA

8-11 April 2018

The purpose of NASA Laboratory Astrophysics Workshop (LAW) 2018 is focused on identifying and prioritizing critical laboratory astrophysics data needs to meet the demands of NASA's current and near-term astrophysics missions. The meeting will also provide a forum within which the community can present and review the current state of knowledge in laboratory astrophysics and identify challenges and opportunities for the field. The agenda will include 17 invited talks, posters, panel discussions, and break-out sessions.

Registration is $250 with a reduced rate of $125 for students and those who received their Ph.D. after April 1, 2016.

Important Deadlines:

- Hotel: March 11, 2018
- Registration: March 16, 2018
- Abstracts: March 22, 2018

Confirmed Invited Speakers:

Keith Arnaud (NASA GSFC)
Nancy Brickhouse (SAO)
Adam Foster (SAO)
Natalie Hell (LLNL)
Els Peeters (U. West. Ontario)
Klaus Pontoppidan (STScI)
Kimberly Ennico Smith (NASA SOFIA)
Susanna Widicus-Weaver (Emory U.)
Peter Bernath (Old Dom. U.)
Steven Federman (U. Toledo)
Harshal Gupta (NSF)
Taisuke Nagayama (Sandia NL)
Robert Petre (NASA GSFC)
Farid Salama (NASA Ames)
Frank Timmes (Ariz. State U.)

Scientific Organizing Committee:

Phillip Stancil (UGA), co-chair, Doug Hudgins (NASA HQ), co-chair, Gary Ferland (U. Kentucky), Bill Latter (NASA HQ), Stefanie Milam (NASA GSFC), David Neufeld (Johns Hopkins U.), Ella Sciamma-O'Brien (NASA Ames), Alan Smale (NASA GSFC), Randall Smith (SAO), Artemis Spyrou (Michigan State U.), Lisa Storrie-Lombardi (JPL), and Glenn Wahlgren (STScI).

E-mail for contact: stancil@physast.uga.edu

Webpage: http://www.physast.uga.edu/workshops/law

Cosmic Dust 2018: Applications and Implications

Geological Museum, Øster Voldgade 5-7, 1350 Copenhagen, Denmark
11-15 June 2018

About the meeting

Cosmic dust, the smoke-like, sub-micron particles that dominate the condensed matter mass of the universe, is vital to nearly all aspects of modern astrophysics, astrochemistry and cosmology, from planet formation to the growth of supermassive black holes. Despite its fundamental importance, we still do not know where most dust originates, what its mineralogy is, how its properties change with environment, and which physical and chemical processes dominate dust formation and evolution. Yet much progress and many exciting discoveries have been made in the preceding years and the time has come to identify potential breakthroughs in our understanding of dust itself, its properties, and how these can best be applied to the most important current problems in astrochemistry, astrophysics and cosmology.

This conference marks the fourth global five-year meeting on cosmic dust, and is designed for the whole community to come together to survey the rapidly changing landscape of dust studies following Herschel, Planck, and Spitzer, and ALMA. Let's synthesise a coherent picture of our understanding of dust immediately prior to the launch of JWST.

Venue

The conference venue is the Geological Museum of the University of Copenhagen, next door to the old Copenhagen Observatory, and located near the city centre, adjacent to parks, cafs, restaurants and more, and is easy to reach by bus, trains and bicycle. Copenhagen is a modern, green city which blends city life and nature through a large walking and cycling trail network.

Registration

Space at the Geological Museum is limited, so please register soon.
Registration and call for abstracts opens February 1st, 2018: https://indico.nbi.ku.dk/event/1040/registrations/
Please find more information about e.g., the meeting, program, venue and the entire schedule here: http://cphdust2018.nbi.ku.dk

Topics Covered

What is dust?

- Observational constraints on dust properties
- Laboratory studies of cosmic dust
- Molecules and dust

The creation of dust

- Dust production by massive stars and supernovae
- Dust production in lower-mass stars
- Non-stellar dust production and the dust cycle in the ISM

Dust as a tool

- Dust in the early universe
- Dust as a probe in galaxies
- Dust in AGN
- Dust as a tracer in the MW and local galaxies

Dust in planet-forming disks

- Grain growth and planet fomration and debris disks
- Dust in the Solar system

List of Invited Speakers:

Bruce Draine, Annalisa DeCia, Cornelia Jäger, Maud Galametz, Gail Zasowski, Mike Barlow, Ilse De Looze, Susanne Höfner, Sundar Srinivasan, Margaret Meixner, Jan Cami, Raffaella Schneider, Akio Inoue, Susanne Aalto, Karin Sandstrom, Almudena Alonso Herrero, Sebastian Hönig, Matt Smith, Carsten Dominik, Zahed Wahhaj, John Bradley

Scientific Organizing Committee:

Anja C. Andersen (University of Copenhagen), Ann Nguyen (NASA), Daniel Asmus (ESO), Daniela Calzetti (University of Massachusetts), Darach Watson (University of Copenhagen), Franciska Kemper (Academia Sinica), Haley Gomez (University of Cardiff), J. D. Smith (University of Toledo), Joao Alves (University of Vienna), Karl Gordon (STScI), Takaya Nozawa (National Astronomical Observatory of Japan), Thomas Henning (Max Planck Institute for Astronomy)

Local Organizing Committee:

Anja C. Andersen, Christa Gall, Darach Watson, Francesco Valentino, Georgios Magdis, Jens Hjorth, Jes K. Jørgensen, Sami M. Dib, Troels Haugbølle

E-mail for contact: CPHDUST2018-info@nbi.ku.dk

Webpage: https://indico.nbi.ku.dk/event/1040/overview

Announcements

Two Post Doctoral Researcher Associate positions in Laboratory Astrophysics at the Open University (UK)

Advertised by: Dr. Helen Jane Fraser

Deadline for both applications: 28 February 2018 (12 noon)
Interviews: 8-13 March 2018

Position One: This project aims to understand how ensembles of icy interstellar grains aggregate to form 'pebbles' in the regions around the snowline in proto-planetary disks, and to establish if this process can generate gas-phase water in the same regions. The successful candidate will continue the development of a novel instrument, designed to study the aggregation of ensembles of icy grains. They will be expected to lead the day-to-day experimental work, data analysis and resulting scientific publications. The experiments will focus on the aggregation of solid mm-sized icy grains, and porous-mm to cm-sized icy grains, as well as quantifying the collision induced outgassing of water. Some of the experiments will be conducted in microgravity environments in addition to the Open University Astrochemistry Laboratories. Applicants will have a PhD in Experimental Physics, Physical Chemistry or Laboratory Astrochemistry or a directly related experimental field, and will be experienced in working with at least two of the following techniques: ultra-high vacuum, mass spectroscopy, cryogenics, ultra-fast video imaging. Additionally, they will have experience of experiment development and experimental computer control and data analysis. The successful candidate will also have excellent communication skills and be able to evidence strong teamwork in scientific or engineering projects, as well as demonstrating an emerging track record of peer-reviewed publications in international scientific journals.

2 year fixed term, until 31st March 2020
£29,799 - £38,833 (based on experience)
Ref: 14377

For more detailed information on how to apply, please visit here

Position Two: This project applies fundamental condensed matter physics and neutron scattering techniques to our understanding of the materials involved in planet aggregation processes. The PDRA will be expected to design and lead experiments to form, manipulate and store the small amorphous icy particles, which will then subsequently be exploited in aggregation studies. The bulk and surface structure of the particles will be characterized using neutron-scattering techniques at a variety of nano- and micrometre length scales, exploiting the ISIS neutron facility at Rutherford Appleton Laboratories, UK. Subsequently the thermal and temporal evolution of these particles will also be investigated. By the time of taking up the post, the successful applicant will have a PhD in Neutron Science, Condensed Matter, Experimental Physics, Physical Chemistry or Laboratory Astrochemistry or a directly related experimental field. They will be experienced in working at large-scale neutron facilities and have experience with at least two of the following techniques: condensed molecular material (ice), cryogens, particle handing, particle characterization methods (e.g. mass distribution, size distribution, spectroscopic analysis). Additionally, they will have experience of neutron scattering experiments and the associated data analysis and necessary coding experience. The successful candidate will also have excellent communication skills and be able to evidence strong teamwork in scientific or engineering projects, as well as demonstrating an emerging track record of peer-reviewed publications in international scientific journals.

1 year fixed term, starting between April 1st and October 1st 2018
£29,799 - £38,833 (based on experience)
Ref: 14379

For detailed information on how to apply please visit here.

You will need to complete an online application and also provide a full academic CV (including names and contact details for three academic referees), a publication list and a cover letter explaining why this project is of interest, how a PDRA fits with your longer-term career aspirations and how you meet the person specifications for the role.

E-mail contact: helen.fraser@open.ac.uk

AstroPAH Newsletter

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

Next issue: 22 March 2017
Submission deadline: 9 March 2017