

# AG 2019



**Mission to the Universe**  
**From Earth to Planets, Stars & Galaxies**  
**16-20 September 2019, Stuttgart**

**Monday, September 16, 2019 - Friday, September 20, 2019**

**University of Stuttgart, Campus Vaihingen**

## **Splinter Meetings (in details)**

Splinter meetings will be held in parallel and may optionally last one, two or three afternoon sessions during the conference.

Below, you can find the list of the already accepted splinter meetings.

**Please note:** Abstract submission for all splinters is done centrally through the Abstract Submission on this Website. Please do not send your abstracts directly to the convenors of the splinter meetings!

## From protoplanetary disks to exoplanets - the story of their formation

**Time:**

Tuesday, September 17, 14:00-18:30

Wednesday, September 18, 14:00-18:30

**Room:** 9.41

**Organizers:**

Dmitry Semenov (MPIA Heidelberg)

Gesa H.-M. Bertrang (MPIA Heidelberg)

Bertram Bitsch (MPIA Heidelberg)

Mario Flock (MPIA Heidelberg)

The formation of stars and their planetary systems are among the key questions in science. Only by addressing these fundamental questions, we can hope to unravel whether solar systems like ours are common and how many Earth-like planets our Galaxy may harbor. In recent years substantial progress in this direction has been achieved thanks to a powerful combination of high-resolution, high-sensitivity observations aided by detailed theoretical modeling and laboratory studies. The composition and properties of exoplanetary atmospheres are now becoming routinely accessible thanks to the high-resolution coronagraphic or spectroscopic observations from the ground and space. The diversity of observed exoplanets and their atmospheric composition suggests a tight link between exoplanets and the properties of their pre-natal environments, protoplanetary disks. From the optical to the (sub-)millimeter, observations provide strong evidence for the ongoing planet formation and the presence of planets in their pre-natal environments, protoplanetary disks.

The goal of the AG 2019 splinter meeting entitled "From protoplanetary disks to exoplanets - the story of their formation" is to bring together the German astrophysical community studying exoplanets, planet formation, and protoplanetary disks. Beside summarizing the status of the field in several lectures and presenting the latest, most interesting results, the organizers hope to stir the discussions and exchange of ideas within our diverse research field.

Key scientific topics include (but are not limited to):

What are the physics and chemistry of planet-forming disks? How do these disks evolve?

What are the conditions under which planets form?

Which processes shape the properties of planets and their atmospheric compositions?

Is our solar system unique or common?

Which processes do we have to test (and exclude) in order to identify the imprints of planets on

disks?

Might other processes (such as magnetic fields) solve the chicken-and-egg problem of planet formation?

**Invited speakers:**

Barbara Ercolano: "The evolution and dispersal of protoplanetary disks" (LMU Munich, DE)

Geoffroy Lesur: "The structure and evolution of protoplanetary disks" (Uni. Grenoble, FR)

Wilhelm Kley: "Planet migration in protoplanetary disks" (Uni. Tuebingen, DE)

Catherine Walsh: "The chemical evolution of protoplanetary disks" (Uni. of Leeds, UK)

Mark Wyatt: "Debris disks" (IoA, Cambridge, UK)

Kees Dullemond: "Theory and observations of dust in protoplanetary discs" (ITA/ZAH Heidelberg)

**Agenda:**

**Related posters:**

Name

Title

person 1

Title 1

person 2

Title 2

## **Cosmic dust and spectral line polarization as analytical tools: Bridging spatial and spectral scales & SOFIA's promise**

**Time:**

Thursday, September 19, 14:00-18:30

**Room:** 47.05

**Organizers:**

Helmut Wiesemeyer (MPIfR Bonn)

Gesa H.-M. Bertrang (MPIA Heidelberg)

Fabio Pereira Santos (MPIA Heidelberg)

In the past years, great efforts were undertaken to measure the Stokes parameters of continuum and spectral line emission across a variety of cosmic environments. This splinter meeting is

motivated by the arrival of polarimetry data from SOFIA and other observatories, operating from optical to radio wavelengths and including interferometers. We intend to offer an opportunity to present recent, exciting data and simulations as well as to discuss open questions and pending tests.

We invite contributions from various fields, out of which we suggest the following topics (the list is not exhaustive):

For the first time, it is possible to obtain the spectral energy distribution of dust polarization, thanks to HAWC+ and other recently commissioned polarimeter cameras. Are we ready to use it as an analytical tool, e.g., for magnetic field tomography? If so, what is the contribution of Zeeman measurements?

How sensitive is dust polarization to magnetic field structure? How can polarized emission be used, by itself or in combination with stellar polarimetry data, to probe grain alignment efficiency in molecular clouds? What is the role of alternative alignment processes?

What is the dynamical role of magnetic fields in the formation of high-mass stars?

What is the role of magnetic fields in the formation of molecular clouds out of cold, neutral matter? Is there a difference between the Galaxy and, e.g., the low metallicity environment of the Magellanic clouds?

What is the link between filamentary molecular cloud structures, the striations feeding them, and the stellar proto-clusters forming inside dense cores?

Recent observations of protoplanetary disks forming around low-mass stars have revealed a wealth of details. What is the role of the magnetic field in the angular momentum budget of the disks, at various evolutionary stages?

What is the role of magnetic fields in late stages of stellar evolution? Are they an important agent for shaping planetary nebulae?

The idea is to schedule short oral contributions and to leave ample time for discussions.

Looking forward to meeting you in Stuttgart!

**Agenda:**

**Related posters:**

Name  
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person 1  
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person 2  
Title 2

## OGLE-ing the variable sky

**Time:**

Tuesday, September 17, 14:00-18:30

**Room:** 9:02

**Organizers:**

Pawel Pietrukowicz (University of Warsaw, Poland)

The Optical Gravitational Lensing Experiment (OGLE) is a long-term large-scale variability survey conducted at Las Campanas Observatory, Chile. The Principal Investigator of the project is Prof. Andrzej Udalski, the 2018 Karl-Schwarzschild Medal winner. OGLE started in 1992, with a monitoring programme of 2 million stars towards the Galactic bulge. The prime goal of the programme was the detection of microlensing events and characterization of dark massive halo objects, suspected components of the mysterious dark matter. Currently, OGLE monitors over 2 billion stars of the Milky Way stripe and Magellanic Clouds in searches for any kind of variable objects: periodic, irregular as well as transients. The survey has a significant impact on modern stellar astrophysics and other fields of astronomy. In 2002, OGLE opened the era of extrasolar planets detection through the transit technique. Out of some 2000 microlensing events recorded every year, several events are of unique planetary nature. OGLE has discovered a full variety of exoplanets: Jupiter-like, ice giants, cold super-Earths, and many candidates for free-floating planets.

Among hundreds of extragalactic transients observed in the background of the Magellanic System, OGLE has found rare types of supernovae and candidates for tidal disruption events. Thanks to regular high-cadance observations, OGLE has discovered and classified, so far, over one million genuine variable stars, including precious pulsating stars, such as Cepheids and RR Lyrae-type stars. These stars are used to trace the structure of young and old populations in the Milky Way and nearby satellite galaxies. Very recently, an unexpected, completely new class of variable stars has been found in the OGLE data, the Blue Large-Amplitude Pulsators. OGLE has provided a proof that rare spectacular phenomena called red novae are stellar mergers. Long-term observations of millions of sources allow studying various processes happening on long time-scales, such as photometric behaviour of quasars and evolutionary changes in stars and stellar systems. During the meeting various OGLE-related topics as well as the OGLE data archive will be presented.

**Agenda:**

**Related posters:**

Name  
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## Future Astronomical Opportunities in Stratosphere and Space

**Time:**

Thursday, September 19, 14:00-18:30

**Room:** 9:41

**Organizers:**

Philipp Maier (IRS, U. Stuttgart)  
Bernhard Schulz (DSI, U. Stuttgart)  
Lars Hanke (U. Tübingen)

With the availability of long flight durations of several weeks to months and increased reliability, balloon-borne astronomical platforms have become increasingly popular again in Europe and worldwide over the last 10 to 15 years. The continuously costly access to space for larger payloads combined with the needs for larger telescopes and specialised, up-to-date instruments makes the comparably flexible and effort-efficient balloon platforms attractive options to complement other observational capabilities.

While institutionalized support for such missions exists elsewhere, it is hardly established in Europe. The goal of this splinter meeting is to bring together members of the European astronomical community with either experience or interest in balloon-borne observations and to create a forum for exchange. The meeting should furthermore serve as a platform to discuss science cases and ideas for future missions as well as potential joint efforts to advance balloon-borne astronomy in Germany and Europe.

**Agenda:**

**Related posters:**

Name  
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person 1

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Title 2

## Cosmic Masers

**Time:**

Wednesday, September 18, 14:00-18:30

**Room:** 9:11

**Organizers:**

Anna Bartkiewicz (Nicolaus Copernicus University, Torun)

Elizabeth Humphreys (European Southern Observatory, Garching)

Bringfried Stecklum (Thueringer Landessternwarte Sternwarte, Tautenburg)

Wouter Vlemmings (Chalmers University of Technology, Gothenburg)

Cosmic masers naturally occur in the interstellar medium, stars and as extragalactic mega-masers. The most popular ones in the radio and (sub)millimetre wavelength range are formed by OH, water, SiO and methanol molecules. Due to their high brightness and compact nature, masers are one of the best existing tools for studying the kinematics and the physical conditions of regions that are hidden in dense environments. In our Galaxy, maser emission is typically found in star-forming regions and evolved stars, and enables us to reach the smallest regions of neutral gas lying close to the central objects like protostars or AGB stars.

In the AG 2019 splinter session "Cosmic Masers" we want to present a diversity of maser studies, summarizing the newest discoveries in this field, presenting recent observations of high-frequency masers, magnetic field studies via polarization measurements, variability behaviours of emission and the scenarios behind them, as well as studying infrared counterparts.

We invite you to join the session, where we can uncover the invisible!

**Agenda:**

**Related posters:**

Name

Title

person 1

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Title 2

## Outreach Meeting (Closed Session, in German)

**Time:**

Thursday, September 19, 14:00-18:30

**If you'd like to attend the Outreach Meeting, please, contact Klaus Jäger or Markus Pössel (outreach-treffen@mpia.de).**

**Room:** Mediathek (0.49) in Pfaffenwaldring 29

**Organizers:**

Klaus Jäger (MPIA Heidelberg)

Markus Pössel (MPIA Heidelberg)

The regular meeting "public outreach in astronomy" brings together stakeholders in astronomy outreach in Germany for an exchange of ideas and for sharing experiences and best practices. The meeting will be held in German.

**Agenda:**

**Related posters:**

Name  
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## EScience and Virtual Observatory

**Time:**

Tuesday, September 17, 14:00-18:30

Wednesday, September 18, 14:00-18:30

**Room:** 9.22

**Organizers:**

Harry Enke (AIP Potsdam)

Kai Posterer (HITS)

Joachim Wambsganss (ZAH)



The importance of publicly available and accessible astronomical data sets for the feasibility and effectiveness of research in astronomy and astrophysics has been shown many times in the past years. From last year, perhaps the most spectacular example is the flood of results employing data release 2 of Gaia, facilitated at least in part by a well-designed, Virtual Observatory-based data dissemination and query infrastructure.

New instruments coming online in the next few years, from Euclid to SKA to LSST, will still require significant evolution as well as development of new methods to enable similar science success stories.

This is not merely a question of publication techniques. It also involves application machine learning, computational statistics or neural networks. Software development for astronomical machinery, for instrument data pipelines, and analysis of data still call for new approaches.

Providing suitable tools and research environments aiding scientists in essentially all fields of astronomy is a central part of astronomical research infrastructure. It will certainly only become more important, as will data management, data access, and data publication. This was recognised by the GWK initiating the NFDI (Nationale Forschungsdaten-Infrastruktur) program. Sharing the lessons learnt in astronomy and exploiting the promises of cross-disciplinary technology development using this platform will therefore be on the agenda for next years.

We invite you to share your experiences and ideas, learn from successful applications, and discuss problems, obstacles and challenges of publishing and exploiting both large and diverse data in our science.

We specially call for contributions to a session:

“Demonstrate your favorite software / tool for doing astronomy!”

### **Agenda:**

### **Related posters:**

Name

Title

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person 2

Title 2

## **The early Milky Way as seen through Galactic Archaeology**

**Time:**

Wednesday, September 18, 14:00-18:30

Thursday, September 19, 14:00-18:30

**Room:** 9.02**Organizers:**

Anke Arentsen (AIP, Potsdam)

Kris Youakim (AIP, Potsdam)

Matthias Steinmetz (AIP, Potsdam)

Saskia Hekker (MPS, Göttingen)

Andreas Koch (ARI, Heidelberg)

Karin Lind (MPIA, Heidelberg)

There is no other galaxy that can be studied in as much detail as our own Milky Way. Only here can we study individual stars in great detail, both in their chemical abundance patterns and also in their kinematic and astrometric properties. By searching for distinct kinematic and chemical signatures, we can infer what the Galaxy was like at early times.

We are currently experiencing a revolution in the field of Galactic Archeology as a result of the Gaia mission as well as several large scale spectroscopic surveys (including multi-object spectrographs like WEAVE and 4MOST) that are either already ongoing or set to begin in the near future.

In this splinter session, we aim to bring together the German community working on various topics related to Galactic Archaeology (both theoretical and observational). Relevant topics include (but are not limited to):

chemical abundance trends and kinematics of the bulge, disk and halo (observations and simulations)

dwarf galaxies, stellar streams and substructure in the halo

metal-poor stars

(future) spectroscopic surveys and Gaia

Each of these individual topics (amongst others) are important to our understanding of the processes involved in formation and evolution of our Galaxy, but bringing them all together and placing them in context with each other is crucial in order to gain a big picture understanding of the (early) history of the Milky Way.

Graduate students are especially encouraged to apply.

**Agenda:****Related posters:**

Name

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## General

## Astro-Frauen-Netzwerk

## Working Group History of Astronomy

## PhD Students Meeting

## SOFIA measurements of Nearby Galaxies and the Central Molecular Zone of the Milky Way

**Time:**

Wednesday, September 18, 14:00-18:30

**Room:** 47.05

**Organizers:**

Juergen Stutzki (Uni Koeln)

Thomas Wilson (MPIfR, Bonn)

The SOFIA data are from the completed “joint impact proposals” on M51 and the Central Molecular Zone (both complete velocity resolved maps in [CII]), several GREAT and FIFI-LS observations of a number of individual galaxies (M 82, M51, IC 342, IC10, NGC6946 and the Large and Small Magellanic Clouds) and the recently started survey program of a large sample of nearby galaxies. These results, in combination with maps of the carbon monoxide molecule, atomic carbon, radio continuum and where possible, optical images are compared with models of galactic evolution and to determine the star formation rates, element abundances, ionization state of the ISM and the details of stellar processing.

The splinter will provide a platform for the collaborators of the above projects, including PhD students, to present first results and to stimulate the interest of the larger community in these results.

**Agenda:****Related posters:**

Name

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## Star formation and stellar feedback: confronting observations and simulations

**Time:**

Tuesday, September 17, 14:00-18:30

**Room:** 47.05**Organizers:**

Nicola Schneider (I. Physik. Institut, University of Cologne)

Hans Zinnecker (ex-DSI, University of Stuttgart, retired DSI guest/visitor)

**Local Organizers:**

Alfred Krabbe (DSI)

Maja Kaźmierczak-Barthel (DSI)

Massive stars play a key role in the evolution of the interstellar medium (ISM) in galaxies. They "stir" the ISM through various processes such as ionization, stellar winds, radiation pressure, and finally supernova explosions. This mechanical and radiative feedback of massive stars on their environment regulates the physical conditions of the ISM, sets its emission characteristics, and ultimately governs the star formation activity through negative (molecular cloud destruction) and positive (cloud compression) feedback. Understanding the physical processes that regulate the impact of massive stars on their environment is thus a key question in modern astrophysics.

Significant observational progress has been achieved during the last decade in particular by submm/(far)-infrared facilities such as Spitzer, Herschel, ALMA, IRAM, SOFIA, and many others. For example, accretion and ejection processes involved in protostellar evolution have been investigated, the ubiquity of Galactic and extragalactic HII-region bubbles was revealed, and spectroscopy of mm- to FIR-lines of CO, of (ionized) carbon, and (neutral) oxygen, helped to better understand the gas cooling of the ISM. In parallel, increasingly more complex simulations and theoretical studies allowed us to advance our understanding of molecular cloud formation and star formation.

We here propose a splinter meeting with the aim of summarizing our current observational and theoretical understanding of feedback effects in the ISM. Individual aspects and current topical projects will be highlighted by presentations of experts in the field. The objective is to stimulate discussions within the community of observers and modelers.

Some key questions that will be addressed are:

How can we translate our observations into diagnostics of ISM parameters such as gas density, gas temperature, strength of UV-field, etc. and what is the best way to compare with simulations?

Which improvements are needed for PDR- and shock-modelling (time dependence, dynamics,..) to better explain the observations?

Which are the dominant feedback processes, including shocks, in various regions? - What about diagnostics for triggered star formation, cluster formation?

What about evidence for protocluster collapse? protostellar accretion bursts?

### **Agenda:**

### **Related posters:**

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## **New Challenges in Stellar Spectroscopy**

### **Time:**

Tuesday, September 17, 14:00-18:30

Wednesday, September 18, 14:00-18:30

**Room:** 9.12

### **Organizers:**

Stephan Geier (AIP, Potsdam)

Helge Todt (AIP, Potsdam)

Maria Bergemann (MPIA, Heidelberg)

Accurate determination of the parameters of stars is of fundamental importance for many fields of astrophysics such as exoplanets, Galactic structure, and cosmology. The quantitative analysis of stellar spectra has a long history in Germany. Especially in the last decade, a significant progress has been made thanks to advanced theoretical model atmospheres for cool and hot stars, the availability of excellent spectroscopic data from X-ray to infrared, improved atomic and molecular

data, and the increase in computing power.

Large spectroscopic, astrometric and photometric stellar surveys such as 4MOST, Gaia or LSST, are revolutionising the field. However, these crucial developments in observational astronomy pose major challenges for the application of the sophisticated theoretical methods to the data. Processing and analysing millions of stellar spectra calls for automated approaches with large model grids and systematic uncertainties due to unavoidable simplifications need to be properly assessed. Besides, these large-scale stellar surveys expose a new kind of challenge — the enormous diversity of stellar objects in the Milky Way and beyond. Peculiar and interesting objects discovered in the new wealth of data, such as very metal-poor stars, red supergiants, or compact remnants of failed thermonuclear supernovae, require tailor-made models and individual analyses.

In connection to that several problems need to be addressed: How can accurate distances and multi-band photometry be combined with spectroscopic analyses in a most efficient way? What are the synergies between spectroscopy and the emerging field of asteroseismology? How do new stellar structure models compare with parameters derived by combining model atmospheres and observations? And finally, how can we best exchange and publish our data, models and codes to make them available for the next generation of researchers in the field?

In this splinter session we aim at gathering the stellar community to present most recent results both in observation and theory. While the focus will be on stellar spectroscopy, alternative methods of quantitative analyses of stars will be discussed as well.

#### **Agenda:**

#### **Related posters:**

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## **Solar activity**

#### **Time:**

Tuesday, September 17, 14:00-18:30

**Room:** 9.11

#### **Organizers:**

Thomas Wiegmann (Goettingen)

Hardi Peter (Goettingen)

Jesper Schou (Goettingen)  
Rolf Schlichenmaier (Freiburg)  
Bernhard Kliem (Potsdam)  
Alexander Warmuth (Potsdam)  
Bernd Heber (Kiel)

Aim of the meeting is to study the magnetic activity of the Sun from the solar interior through the photosphere and atmosphere into the heliosphere. We aim to bring together experts in observation, theory and modelling and invite the submission of abstracts for talks and posters regarding the topics:

Solar dynamo and helioseismology

Measuring and modelling solar magnetic fields in the photosphere, chromosphere, corona and heliosphere

Eruptive phenomena -- flares, filaments, coronal mass ejections, jets

Heating of the upper solar atmosphere

Acceleration and evolution of the solar wind

Solar Energetic Particles (SEPs)

**Agenda:**

**Related posters:**

Name  
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Title 1

person 2  
Title 2

## Computational Astrophysics

**Time:**

Thursday, September 19, 14:00-18:30

**Room:** 9.11

**Organizers:**

Philipp Grete (Michigan State University)

Numerical simulations are a key pillar of modern research. This is especially true for astrophysics where the availability of detailed spatial and temporal data from observations is often sparse for many systems of interest. In many areas large-scale simulations are required, e.g., in support of the interpretation of observations, for theoretical modeling, or in the planning of experiments and observation campaigns. The need and relevance of large-scale simulations in astrophysics is reflected in a significant share of 25-30% of the overall German supercomputing time. While the supercomputing landscape has been stable for a long time, it started to change in recent years on the path towards the first exascale supercomputer. New technologies such as GPUs for general purpose computing, ARM based platforms (versus x86 platforms), and manycore systems in general have been introduced and require to rethink and revisit traditional algorithms and methods.

This splinter meeting will bring together experts in computational astrophysics from all fields covering (but not limited to) fluid-based methods (from hydrodynamics to general relativistic magnetohydrodynamics), kinetic simulations, radiation transport, chemistry, and N-body dynamics applied to astrophysical systems on all scales, e.g., supernovae, planetary and solar dynamos, accretion disks, interstellar, circumgalactic, and intracluster media, or cosmological simulations.

The goal of this meeting is to present and discuss recent developments in computational astrophysics and their application to current problems.

Thus, contributions involving large-scale simulations and new methods/algorithms are specifically welcome.

In addition to astrophysical results obtained from simulations, speakers are also encouraged to highlight numerical challenges they encountered and how they addressed those in their codes. These may include, but are not limited to, new algorithms (e.g., higher-order methods), changing HPC environments (e.g., manycore, GPUs, or FPGAs), or data storage (e.g., availability of space, sharing, or long term retention).

**Agenda:**

**Related posters:**

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# Astronomy and Education

**Time:**

Thursday, September 19, 14:00-18:30

**Room:** 9.12

**Organizers:**

Oliver Schwarz (University of Siegen)

The Bildungsausschuss of the Astronomische Gesellschaft has embarked on this splinter meeting to bring together young scientists working on the broad field of astronomy education. The aim of this splinter session is to exchange knowledge, experiences and ideas of how to bring fundamental issues and latest research into the classroom. In addition students working on their Exams or PhDs get the possibility to present and discuss their thesis and to get into contact with each other.