Netherlands Astronomers' Conference 2024

Monday, May 13, 2024

Check-in and registration - Lounge (10:00 AM – 11:30 AM)

Lunch - Lounge (11:30 AM - 1:00 PM)

Plenary session – Lamoraal-room (1:00 PM - 2:30 PM)

Opening by Nathalie Degenaar, Mitchel Stoop & Peter Barthel (1:00 PM, 15 minutes)

Invited "meet-new-staff": Internal fractionation of atmospheric volatiles on molten exoplanets (1:15 PM, 15 minutes)

Presenter: Tim Lichtenberg (University of Groningen)

Low-mass exoplanets in a fully to partially molten state open a novel window into key processes that shape the earliest, high-temperature evolutionary regimes of rocky worlds and their long-lived climate states. I will outline how magma ocean dynamics and core-mantle chemical segregation influence the feedback mechanisms between largely molten interiors and volatile envelopes. The physical and chemical coupling between magma layers and their equilibrating atmospheres can fractionate the dominant volatiles observable in the upper atmosphere to a degree that is testable with current instrumentation. As a key example, nitrogen species can be suppressed in H-dominated atmospheres if the volatile envelope is in direct contact with a chemically reduced molten interior. With a focus on a few high-priority super-Earth and sub-Neptune exoplanets, I will outline observational tests to distinguish internal phase state and evolutionary scenarios.

Tidal disruption events' constraints on the origin of massive black holes (1:30 PM, 15 minutes)

Presenter: Anna Balaudo (Leiden University)

Observed rates of Tidal Disruption Events (TDEs) can be used to probe the mass function of intermediate mass and massive black holes (MBHs), which in turn contains crucial information on the origin and evolution of these objects. In our latest work, we use semi-analytical codes of galaxy formation - encompassing different astrophysical models of MBH formation and growth - to obtain the rates of detectable TDEs in current and near-future facilities. In this talk I will outline our main findings, showing how TDEs observations can crucially help us distinguish between different MBH seeding mechanisms. I will present the bounds that can be placed on the MBH formation models with TDEs data from ZTF, and discuss forecasts for LSST and ULTRASAT observations. I will also discuss the role of TDE accretion as a channel for MBH growth, and how the inclusion of this additional channel impacts the expected MBH mass function.

A NICER View of the Nearest and Brightest Millisecond Pulsar: PSR J0437−4715 (1:45 PM, 15 minutes)

Presenter: Devarshi Choudhury (University of Amsterdam)

Neutron stars provide a unique laboratory for probing the nature of ultra-dense matter in the universe. NICER, the Neutron Star Interior Composition Explorer is a NASA X-ray telescope aboard the International Space Station designed for Pulse Profile Modeling (PPM) of rotation-powered Millisecond Pulsars (MSPs). Leveraging NICER's megasecond exposures, large effective collecting area, and high time and energy resolution, PPM enables us to precisely measure the properties of these neutron stars, especially mass and radius, providing new insights into dense matter Equations of State. NICER has already successfully obtained radius constraints for two MSPs: PSR J0030+0451 and the massive pulsar PSR J0740+6620. In this talk, I will present our latest analysis on the nearest and brightest MSP, PSR J0437−4715, using the open-source software package X-PSI (X-ray Pulse Simulation and Inference; github.com/xpsi-group/xpsi). In combination with highly informative radio priors and advanced background modeling, for this 1.4 solar mass neutron star, we have inferred the tightest radius constraint obtained by NICER thus far.

Perceptions of the societal responsibility of astronomers in the context of the Africa Millimeter Telescope (2:00 PM, 15 minutes)

Presenter: Maaike Pierik (Radboud University)

In recent years, astronomers are increasingly urged by policy makers and funders to anticipate the societal impact of their research by engaging in early-stage dialogues with society. In addition, recent citizen protests around astronomical facilities have stirred up discussion on the societal responsibility of astronomers. Most prominently, this was visible around the Mauna Kea Observatories in Hawaii, where Native Hawaiians blocked access to the top of the mountain in order to prevent the construction of a new facility, the Thirty-Meter Telescope. These protests showed that science does not always inherently benefit society, although this is an assumption that scientists traditionally use when developing their research. There has been a lot of criticism on the way astronomers have dealt with the citizen protests in Hawaii, even from within the astronomy community. However, there is little research on how astronomers reflect on their societal responsibility and on their interactions with societal groups. In my research, I address this topic by using the Africa Millimeter Telescope (AMT) project as a case study. The AMT will be built in
Namibia as part of the Event Horizon Telescope, a global network of radio telescopes that created the first image of a black hole in 2019. In this talk, I will discuss my first explorative analysis of how astronomers of the AMT enact upon their 'societal responsibility' and which dilemmas emerge for them between 'doing good science' and 'being responsive' to societal needs and wishes. I will also touch on differences I have found so far between the contexts of the AMT project and those of the Mauna Kea Observatories and other astronomical facilities around the world.

Euclid in space! (2:15 PM, 15 minutes)

Presenter: Koen Kuijken (Leiden University)

Euclid was launched on July 1st 2023. It is ESA's latest cosmology mission: a wide field optical+near-IR imager that will map almost 15000 square degrees of extragalactic sky for studding the large-scale structure of the Universe. The first six months of commissioning were exciting, and I will present some of the adventures we encountered as well as discuss the status of the survey so far.

Coffee + Poster Session - Lounge (2:30 PM - 3:00 PM)

Plenary session – Lamoraal-room (3:00 PM - 4:30 PM)

Invited "meet-new-staff": Radio detection of high energy cosmic particles (3:00 PM, 15 minutes)

Presenter: Katharine Mulrey (Radboud University)

Hi everyone! I am Katie Mulrey and I started as an assistant professor at Radboud in August 2021. My research interests focus on the radio detection of high energy cosmic particles, especially cosmic rays and neutrinos. I use radio telescopes like LOFAR (and in the future SKA) to map out the radio footprint of cosmic-ray events and understand their origin. I also work on building in-ice detectors to measure radio signals from the so-far undetected cosmic neutrinos. In this talk, I will introduce myself and give an overview of my work and the science questions I aim to answer.

Mass loss from massive stars as function of metallicity (3:15 PM, 15 minutes)

Presenter: Frank Backs (KU Leuven)

Massive stars have significant effects on their surroundings, they do this through ionizing stellar radiation, mechanical feedback from stellar winds, and energetic supernova explosions. In these processes they shape galaxies and enrich their chemistry with metals and the building blocks for life. The stellar winds also significantly affect the stars themselves. During their relatively short life times of a few million years massive stars can lose half their original mass due to stellar winds. The exact amount of mass lost can significantly affect the evolution of the star. It is now well established that the stellar winds of hot stars scale with metallicity, however the exact dependence remains uncertain. Additionally the behavior of wind inhomogeneities or clumps, which is essential to determining the mass loss rate, as function of metallicity is unknown. I will present a new study of samples of Galactic, LMC and SMC O-type stars with metallicities of solar, half solar and a fifth solar. Scrutinizing optical and UV data to accurately determine the mass-loss rate and clumping properties in the wind. I find evidence for a stronger mass-loss dependence on metallicity for low luminosity stars than at high luminosity. As the earliest stars had lower metallicities this gives insight into the evolution and behavior of stars in the early universe.

Dutch astronomy during the climate crisis (3:30 PM, 15 minutes)

Presenter: Violette Impelizzeri (Leiden University)

The climate emergency is already here and it is happening faster than anyone expected. This means that not only nations need to consider urgent mitigating policies - with UN and EU regulations now mandating a reduction of emissions by 55% in 2030 - but that we all need to become part of a solution. As such, at institutional level, we should also feel empowered to address this global problem, to help curb our own CO2 emissions and create sustainable practises. Astronomers are particularly well suited to address this topic given how deeply aware we are of the diversity and thriving life of our planet: we know we do not have a planet B to move to. In the Netherlands, the RvdA created a working group to monitor and improve sustainability practises in Dutch astronomy. In this talk, I will present an overview of the activities that have been carried out, a study over the CO2 footprint in astronomy research - where air travel dominates, but is not only factor - and possible paths that are being explored to reduce our CO2 emissions as well as creating awareness via communication, outreach and other initiatives.

Spectral Stacking of MHONGOOSE Data - Searching for Neutral Hydrogen Clouds in the Cosmic Web (3:45 PM, 15 minutes)

Presenter: Simone Veronese (ASTRON / University of Groningen)

The investigation of the large-scale distribution of neutral hydrogen (HI) within the cosmic web is fundamental in comprehending the intricate processes governing galaxy formation and evolution. Evidently, the star formation rate observed throughout cosmic history necessitates galaxies to continually replenish their gas reservoir. Theoretical simulations predict that this replenishment primarily occurs via accretion of pristine gas situated within the Inter Galactic Medium (IGM). Nonetheless, the detection and comprehensive characterization of these HI clouds have proven to be formidable endeavors, due to their faint luminosity, compact nature, and sparse distribution. By applying the spectral stacking technique to data from the MeerKAT Observations of Nearby Galactic Objects: Observing Southern Emitters (MHONGOOSE) survey and to state-of-art cosmological simulations, I found a substantial difference in the amount of neutral gas surrounding the mock galaxies and the observed galaxies. In particular, the gas detected via spectral stacking the cosmological simulations is not found in the MHONGOOSE data, suggesting that simulations overpredict the column density of the neutral medium in the outskirt of galaxies. In the talk I will also focus on the limitation of the stacking technique and the need of deeper observations in order to detect the emission of the pristine gas predicted to fueling the star formation over cosmic time.

The MeerKAT single-pulse census of the pulsar population: What do 1.6 million pulsar pulses tell us? (4:00 PM, 15 minutes)

Presenter: Xiaoxi Song (ASTRON)

Single pulses of pulsars show a wealth of phenomena, e.g. drifting subpulses where subpulses systematically march in pulse phase. Such single pulse phenomena are revealed with unprecedented details by using highly sensitive and long enough observations. In addition, the evolution of drifting subpulses across the pulsar population can be studied with large survey projects. These provide crucial clues to the fundamental pulsar emission mechanisms, e.g. if and how the emissions are produced by subbeams rotating around the magnetic axis (the rotation carousel model). In this talk, I will give an overview of the Thousand-Pulsar-Array programme (TPA) on MeerKAT (part of the MeerTime Large Survey Project), the biggest southern hemisphere slow pulsar survey -- to study the pulse shape variability from pulse-to-pulse in 1198 pulsars. In particular, the periodicity of drifting subpulses evolves non-monotonically over the lifetime of pulsars. This non-monotonic evolution strongly suggests that young pulsars possess aliased fast intrinsic modulation. Modelling drifting subpulses as subbeams rotating about the magnetic axis of the pulsar, their circulation must slow down as the pulsar evolves. This is the opposite to the text-book explanation of drifting subpulses due to an ExB drift, and can be resolved if the observed periodicity is due to a beat between an ExB system and the pulsar period. I will also talk about an ongoing project of interpulse pulsars, where the emissions are seen from both magnetic poles. Most interestingly, the emissions are observed to be correlated, while the exact mechanisms for such correlation are still not understood. I will review the analysis of 30+ pulsars in the TPA sample with additional FAST observations for their interesting emission features, giving a flavour of the richness phenomena seen from these pulsars.

Invited “meet-new-staff”: Teaching astronomy (4:15 PM, 15 minutes)

Presenter: Marcel van Daalen

Both as staff and as students, we are all involved in teaching – yet we rarely discuss it, particularly across institutes. During these 15 minutes, we take a first step towards changing this. I will briefly present some best practices in teaching astronomy, before we open the discussion to the room and talk about how to educate effectively, both from the lecturer and the student perspective.

KNA/RNAS Kees de Jager Prize Ceremony – Lamoraal-room (4:30 PM - 5:00 PM)

Conference Photo - TBD (5:00 PM – 5:30 PM)

Free Time (5:30 PM – 6:00 PM)

Dinner – Restaurant (6:00 PM - 8:00 PM)

Evening Lecture - Lamoraal-room (8:00 PM - 9:00 PM)

Katrien Keune - A multi-analytical research approach on Rembrandts' masterpiece The Night Watch

Presenter: Katrien Keune (University of Amsterdam)

Katrien Keune PhD, chemist, is head of Science at the Rijksmuseum Amsterdam and professor by special appointment of Molecular Spectroscopy at the University of Amsterdam (UvA), Netherlands. The Science department, a sub-department of Conservation & Science, conducts research on the Rijksmuseum collection in close collaboration with conservators, curators and (technical) art historians. Keune is specialized in ageing and degradation studies of pigments and oil paintings at the micro- and molecular level. She initiated and (co)led many national and international interdisciplinary research projects funded by programmes as Horizon Europa, EU-H2020, EU-JPI, NWO-NICAS and NWO-TALENT. One such project is the GoGreen project (Horizon Europa, 2022-2026) of which Keune is the coordinator. This project aims to develop green strategies to conserve the past and preserve the future of our cultural heritage. At the Rijksmuseum, she leads the scientific research of Operation Night Watch, the largest research project on Rembrandt's masterpiece.

Figure 1. The Night Watch (1642) by Rembrandt van Rijn was investigated inside the glass chamber in the Gallery of Honour, Rijksmuseum, Amsterdam, The Netherlands

Operation Night Watch is the largest research and conservation project that Rembrandt's masterpiece *The Night Watch* (1642, oil on canvas, h 378.4 x w 453 cm) has ever undergone. In the summer of 2019, the Rijksmuseum embarked on this multi-year project with the goal of thoroughly studying the condition and painting technique to determine the best treatment plan for the large canvas painting. *The Night Watch* was researched in situ in the gallery inside an ultra-transparent glass chamber in full view of the public (Fig. 1). The multi-disciplinary team of Operation Night Watch includes scientists, conservators and art historians, and collaborates with museums and universities in the Netherlands and abroad. Together they work alongside each other on the acquisition and interpretation of the research data. The latest and most advanced research techniques are being used, ranging from digital imaging and scientific and technical research to computer science and artificial intelligence. The non-invasive macroscale imaging technologies that have been employed include macro X-ray fluorescence, macro X-ray powder diffraction, reflectance imaging spectroscopy, optical coherence tomography, high resolution photography and 3D scanning. The combined approach was essential to gain insight into the complex (art)historical and material information to answer the (technical) art history, conservation, and scientific questions. Parallel to this, microscale imaging analyses were carried out on embedded and loose microsamples making use of light microscopy, imaging-ATR-FTIR, scanning electron microscopy combined with X-ray elemental analyses, micro-Raman and synchrotron-based X-ray fluorescence and diffraction techniques in 2D and 3D mode. In the lecture, attendees will receive the latest insights into Rembrandt's painting technique, learn about the condition of the painting, and explore the implications for the upcoming conservation treatment.

Free time - Bar open - Pub O'Donnell's (9:00 PM - 12:00 AM)

Tuesday, May 14, 2024

Breakfast – Restaurant (07:30 AM – 09:00 AM)

Network Parallel Sessions (9:00 AM - 10:15 AM)

Network 1 – Lamoraal-room (9:00 AM - 10:15 AM)

Disruptions in galactic nuclei from chaotic orbits (9:00 AM, 15 minutes)

Presenter: Zephyr Penoyre (Leiden University)

The centers of galaxies like our own are usually dominated by disk structures at scales of tens to hundreds of parsecs - and thus orbits near the galactic center are in axisymmetric potentials which conserve only one component of their angular momentum if an orbit comes close enough the central super massive black hole there can be disruptions, leading to the creation of hyper-velocity stars, tidal disruption events or extreme mass ratio insprials in this talk i'll show how some orbit families (particularly chaotic ones) in such a potential can lead to plunges in the total angular momentum of stars, making close passages to the SMBH possible - i will discuss the types of orbit that will lead to disruptions and give initial estimates for the rates.

Hypervelocity star observations constrain the Galactic Centre (9:15 AM, 15 minutes)

Presenter: Sill Verberne (Leiden University)

Hypervelocity stars (HVSs) are stars which have been ejected from the Galactic Centre (GC) at velocities of up to a few thousand km/s. They are tracers of the Galactic potential and can be used to infer properties of the GC, such as the initial-mass function and dynamical history. HVSs are rare, however, with only about a dozen promising candidates discovered so far. Discovering and characterising additional HVSs would allow us to fully exploit their scientific potential, but even non-detections can and have been used to provide important constraints on the ejection of HVSs and on the properties of the GC. In a recent survey, we obtained follow-up observations of prime HVS candidates identified in Gaia using a novel method. Through the combination of the non-detection of new HVSs in our survey with sophisticated simulations, we have been able to significantly improve upon current constraints for the production of HVSs and the properties of the GC. In this talk, I will present these results. In addition, I will describe the discovery space of HVSs that still remain unidentified in the full Gaia catalogue, containing some 2B stars.

Identifying the most metal-poor stars in the APOGEE survey (9:30 AM, 15 minutes)

Presenter: Martin Montelius (University of Groningen)

The study of our galaxy has been revolutionised in the last few decades by the advent of large scale spectroscopic surveys, providing kinematic and chemical information for hundreds of thousands of stars. The design of each survey is different with unique advantages and tradeoffs. The APOGEE survey is the only stellar spectroscopic survey that uses infrared spectra, which enables observations of the dust obscured inner regions of our galaxy. A drawback to APOGEE's approach is a lack of chemical data for the most metal-poor stars, an important population for the study of the earliest stages of galaxy formation. In this talk I will present a simple method for identifying the most metal-poor stars observed by APOGEE and early results of a spectral analysis of these stars and a kinematic study of the metal poor bulge.

NGC 5253: Peering into the massive star formation chemical enrichment at pc scales. (9:45 AM, 15 minutes)

Presenter: Brigitte Pruijt (Leiden University)

NGC 5253 is a Blue Compact Dwarf (BCD) galaxy located at a distance of just 3.6 Mpc. The galaxy is well-known for its three super massive young super star clusters (SSCs), and nitrogen enrichment found in its centre. Given its similarity with extreme star forming galaxies at high redshift, studying this object at high spatial resolution can give insight on the chemical enrichment processes at play in the earliest galaxies. Using new Multi-Unit Spectroscopic Explorer (MUSE) Narrow Field Mode adaptive optics assisted data, we are able to trace the interstellar medium, ionised gas, and dust in the giant HII region around the SSCs at resolutions previously unattainable. This contribution will cover the physical properties, including ionisation structure, electron density, and temperature, as well as the chemical aspects such as metallicity and relative abundances of the ionised gas in the closest vicinity of the SSCs. Furthermore, our analysis reveals differences in the derived attenuation-related parameters (E(B-V) and Rv) for each of the three SSCs, suggesting variations in dust properties within these clusters.

Dust: using simulations to understand the evolution in observations (10:00 AM, 15 minutes)

Presenter: Stefan van der Giessen (Ghent University / Universidad de Granada)

Dust, a material that makes up only 1\% of the interstellar medium, yet it plays a key role in the evolution of galaxies by absorbing interstellar emission to allow molecular gas to cool and reach density thresholds to form stars. This absorption and eventually re-emission causes dust to be responsible for up to 50\% of the emission we gather from galaxies, making it one of the largest drivers for uncertainties in

determining stellar properties, especially with the rise of highly obscured sources at high-redshift. The uncertainties get even harder to solve as the origin of dust remains one of the most difficult questions to answer as we cannot directly observe dust grains and the potential timescales at which dust growths remain long enough to not be captured by a human life time. That is why galaxy simulations that include the potential origin and evolution of dust have become a key player in understanding the efficiency of many dust evolution processes. For this talk, we will highlight one of the most detailed galaxy simulations when it comes to the evolution of dust: the GADGET4 - OSAKA simulations. This simulation suite can be calibrated to align with the stellar and gas properties from a chosen galaxy to calculate the evolution of the dust grains with 30 different grain sizes possible within the estimated grain size distribution. The talk itself focuses on the comparison in dust properties and small-to-large grain ratios between a simulated galaxy calibrated to nearby galaxy NGC628 and the observations of four nearby galaxies: NGC628, M101, M33, and NGC300. The simulations can match the observed dust mass surface densities in NGC628, yet the small-to-large grain ratio is overestimated. When the simulation varies the accretion timescale or the subgrid model describing the molecular cloud density structure, we recover that the dust mass surface density and small-to-large grain ratio remain unchanged, whereas the molecular cloud structure changes the average small-to-large grain ratio significantly depending on the location in the disk.

Network 2 – Room 558 (9:00 AM - 10:15 AM)

Recalibrating our search for diverse exo-worlds (9:00 AM, 15 minutes)

Presenter: Mariam Haidar (KU Leuven)

Long-term, stable wavelength calibration strategies are absolutely essential if we are to detect and characterize star-planet systems with a higher radial velocity precision. MARVEL is a new state-of-the-art facility at the Mercator Observatory (La Palma, Spain), that intends to accomplish a precision of 1 m/s. The array of four 80cm telescopes feeding a single high-resolution echelle spectrograph and projecting onto a single detector can operate in unison to target single objects, and independently, to study four objects simultaneously. This dedicated surveying facility will provide essential ground-based RV follow-up on transit measurements by previous and upcoming space missions. We will describe the MARVEL wavelength calibration system and the strategy that will be deployed to maximize calibration precision and long-term stability.

Milli-arcsecond imaging with VLTI/Asgard (9:15 AM, 15 minutes)

Presenter: Denis Defrere (KU Leuven)

ESO's Very Large Telescope Interferometer has a history of record-breaking discoveries in astrophysics and instrumentation. The next leap forward is its new visitor instrument: the Asgard instrumental suite. It comprises four natively collaborating instruments: HEIMDALLR, an instrument performing both fringe tracking and stellar interferometry with the same optics, simultaneously, in the K band; Baldr, a Strehl optimizer in the H band; BIFROST, a combiner to study the formation processes and properties of stellar and planetary systems in the Y-J-H bands; and NOTT, a nulling interferometer dedicated to imaging young nearby planetary systems in the L band. The suite is in its integration phase in Europe and should be shipped to Paranal in 2025 after approval from ESO. In this talk, we outline the key science cases of the Asgard instruments and the status of the project.

Radiative Window in Jupiter's Atmosphere? (9:30 AM, 15 minutes)

Presenter: Louis Siebenaler (Leiden University)

Our understanding of the giant planets in our solar system has been significantly advanced by the Juno and Cassini missions.
These planets provide us with the unique opportunity to understand the interior structure of giant exoplanets. Recent insight into Jupiter's atmospheric composition indicates a water concentration of 2-8 times solar in the equatorial region, surpassing the subsolar findings of the precursor Galileo mission. In this study, we conduct radiative transfer calculations for Jupiter's deep atmosphere including these enhanced water enrichment results and the presence of condensates predicted by chemical equilibrium models. Our primary focus is to derive a new temperature-pressure profile and assess the existence of potential radiative zones within the deep atmosphere. The presence of a radiative zone can have a profound impact on the internal structure of a planet and thus, a detailed analysis of Jupiter's temperature profile is essential for a comprehensive study of its interior structure.

Retrieving the Sulfur Chemistry of Irradiated Exoplanets (9:45 AM, 15 minutes)

Presenter: Wiebe de Gruijter (University of Amsterdam)

Exoplanets of approximately the size of Jupiter but with an orbital distance to their host star even closer than Mercury is to the Sun are called Hot Jupiters. Due to the intense radiation they receive from their host star, they have high temperatures of hundreds to even thousands degrees Kelvin, and the chemical composition of their atmosphere is strongly influenced by the effects of photochemistry. Transmission spectroscopy is a powerful tool to retrieve mixing ratios of molecular species in hot Jupiter atmospheres, and from that to extract key physical information. Unfortunately, due to the high computational expense of calculating photochemistry it is not possible to take the effects of this process into account in retrievals. In this talk, we present the case of photochemically produced SO2 to show how this can lead to large inaccuracies in the retrieved parameters. Subsequently, we use the ARCIS retrieval code to introduce a way to include a

parameterized treatment of photochemistry in the retrievals, which allows us to extract more accurate physical information from the spectrum.

Forming equal-mass planetary binaries via pebble accretion (10:00 AM, 15 minutes)

Presenter: Tom Konijn (TU Delft)

Binary planetary bodies are rarely discussed in planetary formation, yet these systems are highly interesting, particularly (near-) equal-mass binaries. Multiple studies have shown planetary objects to form in binaries during the early formation stages, potentially explaining known systems such as Pluto-Charon, the contact binary 67P, and many other observed binaries in the Kuiper and asteroid belts. The recent discovery of 40 free-floating Jupiter Mass Binary Objects (JUMBOs) in the Trapezium cluster has sparked renewed interest in understanding the mechanisms behind binary formation. Did these binaries perhaps originate as binary embryos within a stellar system, only to be later expelled? This talk will examine binary planetary embryos that formed early, when the protoplanetary gas disk was still present, and how they grow as a result of pebble accretion. Can this process explain observed equal-mass binaries? And where will future studies look at?

Network 3 – Room 559 (9:00 AM - 10:15 AM)

The Event Horizon Telescope and Africa Millimetre Telescope: Current status and future plans (9:00 AM, 15 minutes)

Presenter: Michael Janssen (Radboud University)

The Event Horizon Telescope (EHT) is a very long baseline interferometry (VLBI) array used to image black holes by combining millimetre/submillimetre radio observatories into an Earth-sized virtual telescope. I will review the latest findings of the EHT of AGN jets and horizon-scale studies, including new results on Sgr A* that are going to be published end of March. I will then give an outlook for the future of the EHT and millimetre VLBI in general, in terms of science, hardware, and software. I will focus on the Africa Millimetre Telescope (AMT) as the only NL telescope that can join EHT observations. The AMT is planned to be built in Namibia and to be operational in 2028. The AMT and further EHT improvements will facilitate improve tests of GR, plasma, accretion, and jet physics. Next to EHT science, I will describe the AMT's contribution to the broad range of science cases across the NOVA networks in the fields of galactic astrometry, astrochemistry, and rapid response to transients.

Prospects for measuring high-energy cosmic rays at SKA-Low (9:15 AM, 15 minutes)

Presenter: Arthur Corstanje (Vrije Universiteit Brussel)

Over the last decade, LOFAR has been used to measure radio signals from high-energy cosmic rays around 10^17 eV. These produce air showers, a cascade of secondary particles reaching a peak at an atmospheric depth called X_max which is sensitive to the primary particle's mass. The SKA-Low telescope being constructed in Australia presents a two orders of magnitude increase in number of antennas, featuring nearly 60,000 antennas in a 1 km diameter area. A simulation study building on our experience with LOFAR shows that SKA will be able to track the air shower evolution into more detail than just its maximum X_max. This would help in determining the cosmic-ray mass composition more accurately, and in particular the proton fraction which is astrophysically relevant, yet difficult to distinguish from helium. Moreover, the main hadronic interaction models predict observably different shower profiles. Hence, measuring these would be helpful in constraining hadronic physics beyond energy levels accessible in particle colliders. I will give an overview of the technique and of the unique capabilities of SKA-Low for high-energy cosmic-ray measurements.

Evolution of AGN feedback in the galaxy group Nest 200047 over cosmic time (9:30 AM, 15 minutes)

Presenter: Anwesh Majumder (SRON / University of Amsterdam)

We report on large-scale X-ray properties of the remarkable galaxy group Nest 200047 using 140 ks Chandra and 25 ks XMM-Newton data. The galaxy group Nest 200047 hosts a remarkably complex structure comprising four pairs of distinct radio lobes: the largest number of consecutive AGN outbursts known to date. Its outermost radio structures, extending to over 200 kpc radius, rival the largest cavities discovered in more massive clusters. They exhibit a striking array of filamentary radio structures, likely representing the most advanced stage of bubble evolution observed so far. We find a limb-brightened cavity in the X-ray data corresponding to the third-largest radio bubble, estimating that the central AGN has been driving energy of ~7e57 erg into the intragroup medium (IGrM). We also find indications of temperature and density fluctuation corresponding to the largest radio lobe in the XMM data that suggest the central AGN is heating the IGrM at the largest scale. Based on the thermodynamic properties near the core, we are currently constraining the accretion power of the central AGN and estimating what fraction of this energy ends up heating the IGrM. Nest 200047's proximity and recurrent AGN activity will allow us to infer multi-scale impact and time evolution of kinetic-mode feedback over hundreds of Myr.

Tidal Disruption Events: energy dissipation from spaghettified stars (9:45 AM, 15 minutes)

Presenter: Paola Martire (Leiden University)

The detection and characterisation of Tidal Disruption Events (TDEs) represents a unique powerful tool to investigate the mass distribution of Intermediate Mass Black Holes (IMBHs). These transients happen when a star approaches a Black Hole and is torn apart by tidal forces, releasing an amount of energy comparable to that of a SuperNova. Since current and future surveys are able to detect TDEs, having a robust physical model to describe them will allow to constrain the involved (few) parameters, such as the mass and the spin of the IMBH and the mass of the star. Simulations are necessary instruments to model these transients. However, until now they have not been able to realistically follow the evolution of the system from the disruption of the star to late times, due to numerical challenges. These issues have now been overcome and we are running and analysing the first ab initio simulations of TDEs. In this talk I will present the first results obtained in this analysis for different values of the involved parameters. I will focus on the shocks happening during these events, investigating their geometry and physical mechanism. Finally, I will show synthetic spectra for future comparison with observations.

Pulsar J1906+0746 at FAST: a unique exploration of radio-pulsar beam maps (10:00 AM, 15 minutes)

Presenter: Yuyang Wang (University of Amsterdam)

PSR J1906+0746 is a young binary pulsar with a spin period of P ∼ 144 ms in a very short 4-hr orbit around another neutron star. It provides a great opportunity to study both the relativistic spin-precession predicted by General Relativity (GR), and the little-understood radio pulsar emission in a single source in a self-consistent way. Discovered with Arecibo in 2004, it showed both a “main pulse” (MP) and “interpulse” (IP), indicating a nearly orthogonal geometry where emission from both magnetic poles is visible. The emission is highly polarised. The unique geodetic precession of this young pulsar can be used to demonstrate the validity of the geometrical model of pulsar polarisation as well as gravity theories. Now, ~60 hours of highly sensitive FAST observations in 2022, 2023 and 2024, will allow us to derive more accurate timing results including spin parameters, Keplerian and Post-Keplerian (PK) parameters, and produce updated emission beam maps. In this talk, we will introduce the scientific interests and opportunities of this pulsar system, and present the current status of J1906+0746 timing using FAST data.

Coffee + Poster Session - Lounge (10:15 AM - 10:45 AM)

Network Parallel Sessions (10:45 AM – 12:00 PM)

Network 1 – Lamoraal-room (10:45 AM - 12:00 PM)

The remarkable NGC 4781 MHONGOOSE triplet (10:45 AM, 15 minutes)

Presenter: Dane Kleiner (ASTRON)

I will present high resolution, ultra-deep HI images of the nearby, newly discovered interacting NGC 4781 triplet, observed by MeerKAT as part of the MHONGOOSE survey. The triplet is situated at 11 Mpc, and consists of two late types and one dwarf irregular galaxy. The global properties and scaling relations are consistent with other late type, star forming galaxies of the same stellar mass. However, the diffuse (10^17 - 10^18 cm^-2) HI component shows a remarkable new scenario of interacting galaxies. There is extensive (~ 50 kpc) extra-planar HI gas associated with the two late type galaxies as well as an extended HI tail complex that connects the two satellite galaxies. The HI velocity field shows many diffuse components that are not associated with the rotating disk, and both late types contain large coherent arcs of HI with a high (30 - 80 km s^-1) velocity dispersion, well outside the stellar disk. Two quick, successive flybys that tidally disturbed the diffuse HI but left the HI in the disk and stellar component largely untouched, is likely responsible for the observed properties. We compute the timescale of the flybys and compare it to similar galaxies in the SIMBA simulations. We predict it is very common for late-type, star-forming galaxies in close (e.g. < 100 kpc) proximity to host diffuse, extensive HI complexes, however, only now do we have the sensitivity and resolution to detect them.

Complex organic molecules in the turbulent circumnuclear disc of a young radio galaxy (11:00 AM, 15 minutes)

Presenter: Suma Murthy (JIVE)

Detailed studies of the composition, kinematics and physical conditions of cold gas in extreme irradiated and shocked environments, such as close to an active galactic nucleus (AGN), provide new insights into the chemical pathways which are not observed in other environments. I will present the discovery of an unusually strong absorption feature at a rest frequency of ~97.88 GHz in a radio-loud AGN 4C 31.04. We identify this line to be either CH3CH2CN (6-1) (Ethyl Cyanide) or CH3SH (31-30)
(Methyl Mercaptan). We also find other absorption and emission lines from Ethyl Cyanide at rest frequencies ~116.5 GHz and ~98.5 GHz respectively, suggesting that the line at 97.88 GHz is very likely Ethyl cyanide. We also detect strong HI, CO and CN absorption lines. Intriguingly, generally expected transitions of other molecules such as CH3OH, SO2 and CS are absent, suggesting a very different chemistry in this case than that observed in the central molecular zone of the Galaxy, or hot cores in nearby star-forming regions. Based on pc-scale atomic gas observations, we conclude that the molecular absorption arises from a highly turbulent circumnuclear gas with which the radio jets of 4C 31.04 are interacting strongly, driving an outflow. Irrespective of the identification of the line, we find a significant abundance enhancement of many orders of magnitude for the Complex Organic Molecule (COM) giving rise to this absorption (≥0.001). This is the first time that such a COM is detected in the circumnuclear disc of a radio AGN. We suggest that its unexpectedly high gas-phase abundance so

close to the active SMBH is likely due to shocks or cosmic rays driven by the radio jets. This discovery potentially presents a new challenge to existing chemical models regarding the production and sustenance of such COMs in extreme environments.

JWST/MIRI imaging in the CEERS and MEGA surveys (11:15 AM, 15 minutes)

Presenter: Guang Yang (University of Groningen)

The MIRI instrument onboard JWST is changing our understanding of extragalactic astronomy, thanks to its unprecedented sensitivity and angular resolution. The Cosmic Evolution Early Release Science Survey (CEERS) JWST program has a total of 8 MIRI imaging pointings in the EGS field. All of the MIRI observations have been performed, and we have reduced the data (Yang et al. 2023). Based on these data, we have performed various scientific investigations about galaxy star formation, stellar mass, mid-IR morphology, and active galactic nuclei (AGN). We have an even larger MIRI program, MIRI EGS Galaxy and AGN Survey (MEGA), which has been approved in JWST Cycle 2. MEGA will bring us new MIRI data of 26 pointings also in the EGS field (tracing the existing NIRCam coverage). All pointings will have four filters F770W, F1000W, F1500W, and F2100W. We expect exciting scientific results to come out based on the MEGA+CEERS dataset.

Unraveling the formation and evolution of massive quiescent galaxies at z = 1-3 with JWST (11:30 AM, 15 minutes)

Presenter: Martje Slob (Leiden University)

One of the most remarkable discoveries in extra-galactic astronomy from the past two decades is the existence of a population of quiescent galaxies at z ~ 2 and beyond. Observations have shown that compared to their local counterparts, these distant quiescent galaxies have lower metallicities, and have rotating disc structures similar to star-forming galaxies. These results challenge our models for the formation and subsequent evolution of high-z quiescent galaxies. However, pre-JWST it was extremely challenging to obtain deep, high-resolution spectra for these systems, leading to small sample sizes and a limited understanding of the properties of the population. In this talk, I will present the first results from our JWST SUSPENSE program, which obtained ultra-deep high-resolution spectra for a sample of 20 quiescent galaxies at z=1-3. We obtain detailed star-formation histories for these galaxies, which show that distant quiescent galaxies form earlier and over shorter star-formation timescales compared to low redshifts. When combining this with preliminary results from the kinematic en structural properties of our sample, our findings indicate that rotating disc structures are not destroyed in the formation of distant quiescent galaxies. Instead, we find that quenching at high z does not lead to big structural changes in the galaxy, challenging current models for star-formation quenching.

The large-scale structure around the Fornax-Eridanus Complex (11:45 AM, 15 minutes)

Presenter: Maria Angela Raj (University of Groningen)

I present a multi-disciplinary study of the filamentary network around the Fornax-Eridanus Complex to probe the influence of the large-scale environment on galaxy morphology. To extract filaments from real data, we employ the novel machine-learning tool, 1-DREAM (1-Dimensional, Recovery, Extraction, and Analysis of Manifolds). We then use the morphology-density relation of galaxies to examine a galaxy's dependence with regard to its local environment in filaments. The detected filaments showcase a variety of environments and are heterogeneous in nature. In this context, we reveal a well-known structure -- the Fornax Wall, that passes through the Dorado group, Fornax cluster, and Eridanus supergroup. With regard to the morphology of galaxies, we find that early-type galaxies are prevalent in high-density filaments and high-density regions of the Fornax Wall. The next step is to incorporate deep photometry (e.g., truncation radius, colour gradients, asymmetries) from wide-field and deep images to comprehend the mechanisms responsible for the galaxies' morphological changes. Our study provides insights into pre-processing of galaxies in LSS by connecting their detected filaments, observational properties, and their faint outskirts. While there have been studies on the evolution of galaxies in large-scale structures, none have made comparisons of the same to the low-surface brightness (LSB) features of galaxies in the LSS which are only detectable in deep images. Such comparisons are vital – to understanding the role of the environment in shaping galaxies. Using 1DREAM, segmentation tools (e.g. Max-Tree Objects), and deep photometry, I will also briefly discuss the possibility of including LSB galaxies in filament-detection with Euclid.

Network 2 – Room 558 (10:45 AM - 12:00 PM)

The MIRI mid-INfrared Disk Survey (10:45 AM, 15 minutes)

Presenter: Inga Kamp (University of Groningen)

Our understanding of planet formation has changed recently, embracing the new idea of pebble accretion. This means that the influx of pebbles from the outer regions of planet-forming disks to their inner zones could determine the composition of planets and their atmospheres. The solid and molecular components delivered to the planet-forming region can be best characterized by midinfrared spectroscopy. With Spitzer low-resolution (R=100, 600) spectroscopy, this approach was limited to the detection of abundant molecules such as OH, H2O, C2H2, HCN and CO2. Due do the sensitivity and spectral resolution provided by JWST we now have a unique tool to obtain the full inventory of chemistry in the inner disks of solar-types stars and brown dwarfs, including also less abundant hydrocarbons and isotopologues. The Integral Field Unit (IFU) capabilities enables at the same time spatial studies of the continuum and line emission in extended sources such as debris disks, the flying saucer and also the search for mid-IR signatures of forming planets in systems such as PDS 70. In this talk, I will present a top level overview of the first results of the MINDS (MIRI mid-INfrared Disk Survey, PI: Th. Henning) survey.

A planetary nebula with "freckles". The case of NGC 4361 as dissected with MUSE. (11:00 AM, 15 minutes)

Presenter: Ana Monreal Ibero (Leiden University)

Optical integral field spectroscopy of planetary nebulae (PNe) provides a unique tool to explore the spatial relationships between the complex mixture of the many components -- neutral, low and high ionization gas, dust and central star -- and their underlying physical conditions. In this contribution, we highlight selected results on a detailed analysis of the optical line and continuum emission in the very high ionization Galactic PN, NGC 4361, based on MUSE commissioning data in its Wide Field (60"x60") normal (4750-9300 Å) mode. MUSE revealed weak extended [N II] emission as well as >100 spatially unresolved [NII] emitting knots, that we dubbed the "freckels". There are several linear associations of these knots but none point back convincingly to the central star. They have low-moderate ionization with Te~11000 K, Ne~1500 cm^{-3}, generally show higher extinction than the extended high ionization nebula and present velocity offsets in [NII] with respect to the main nebula, as traced by the velocities of Halpha emission line. The results suggests that NGC 4361 is not completely optically thin. The identified low ionization 'freckles' do not clearly appear to diffeer in (He, N, O, S) abundance with respect to the extended high ionization gas. The spatial distribution and radial velocities of these features suggest that they belong to a thick disk oriented perpendicular to the large-scale nebular gas, perhaps remnants of an earlier structure.

The wind properties of low metallicity massive stars (11:15 AM, 15 minutes)

Presenter: Ciaran Furey (University of Amsterdam)

Massive stars are stars whose mass (M) is greater than 8 times that of the Sun. While they only live for a mere 3 to 50 Myr, they heavily impact their surroundings. For example, they drive strong stellar winds, which inject kinetic energy and nuclear processed materials into their environment, therefore affecting local star formation. The properties and structure of these stellar winds are not very well understood, however, especially at low metallicity (Z). This low Z regime is of particular interest if one wants to gain insight into the nature of the very first stars in the Universe, as these were composed entirely of hydrogen and helium generated after the Big Bang. Several dwarf galaxies in the Local Group have metal contents that are extremely low. By accurately constraining the wind properties of the massive stars within these galaxies, we will learn more about the evolution of massive stars, as winds can severely impact this, while also learning more about the nature of the first stars. To do this, it is imperative to analyse both the optical and ultraviolet spectra of these stars. In this talk, I will introduce these distant, low Z, massive stars. I will outline the methods we use, namely quantitative spectroscopy, and the genetic algorithm Kiwi-GA, which is used with the stellar atmosphere code FASTWIND to obtain the stellar and wind parameters of these stars. Finally, I will present our results from the lowest Z test to date of the theory of hot star winds, and their implications for our understanding of the first stars in the Universe.

Understanding cold dense gas ratios in the outer galaxy with SHAP (11:30 AM, 15 minutes)

Presenter: Gijs Vermarien (Leiden University)

The outer milky way is an environment with a lower carbon and oxygen content. This influences the formation and survival of molecules during star formation in this region. In this work we try to understand the nonlinearity between the state of the physical environment, including the initial chemical content, of these cold dense gas clouds and the observed ratios of the gas. To this end we use the open-source gas-grain chemistry code UCLCHEM to simulate the evolution of the molecules for a grid of physical parameters. Subsequently we apply Shapley Additive Values (SHAP) to understand not only correlations, but also the higher order nonlinearities of these models. We find that the ratios can posses highly nonlinear behaviour as a function of well known parameters, such as temperature, density and radiation field, but these patterns can become even more complex with varying the carbon and oxygen initial abundance.

The WISCI project: Exploring dust properties in the nearby diffuse interstellar medium (11:45 AM, 15 minutes)

Presenter: Sascha Zeegers (European Space Agency, ESTEC)

Interstellar dust grains may cycle through several clouds throughout their lifetime. These clouds can have different densities and the grains encounter various environments which may alter the properties of the grains. JWST enables us to observe dust in the nearby (<3 kpc) diffuse interstellar medium in unprecedented detail. By making use of background stars, we can observe the extinction of stellar light by dust grains which may reveal grain properties of the dust, such as the chemical composition, structure and size of the dust grains. In this talk I will present the Webb Investigation of Silicates, Carbons and Ices (WISCI) project in which we study dust along the line of sight of twelve OB stars in the Milky Way, using JWST MIRI and NIRCam (GO cycle 1 program id 2183), HST STIS (cycle 30 program id 17078) and VLT XSHOOTER spectroscopy. The wavelength coverage, sensitivity, and spectral resolution of JWST at near- and mid-infrared wavelengths in combination with HST and VLT observations enables a detailed multiwavelength study of the dust along these twelve sightlines. In this talk I will present the first exciting results from tis study.

Network 3 – Room 559 (10:45 AM - 12:00 PM)

Exploring the nature of unusual GRB 210704A (10:45 AM, 15 minutes)

Presenter: Danielle Pieterse (Radboud University)

Historically, gamma-ray bursts (GRBs) are categorised into two classes: short GRBs (duration < 2 s) that are linked to compact object mergers and long GRBs linked to the death of massive stars. However, recent observations have shown that the population of GRBs is more complex.

Understanding atypical GRBs can shed more light on this population and the progenitor systems. We present the observations of GRB 210704A: a burst with a short main emission peak followed by a faint high-energy emission tail. Multi-wavelength observations show an optical and infrared excess, peaking days after the GRB. We use the Bayesian inference package Redback to fit EM transients to the multi-band data of GRB 210704A to understand the origin of the excess and shed light on the progenitor system.

The unique white dwarf pulsar J1912-4410 (11:00 AM, 15 minutes)

Presenter: Patrick Woudt (University of Cape Town)

The recent discovery of J191213.72-441045.1 (J1912-4410 hereafter) as the second white dwarf pulsar has firmly established white dwarf pulsars in compact binary systems as a separate class of objects, supporting formation models of white dwarf pulsars and offering new insights into the evolution of magnetic cataclysmic variables. The white dwarf in J1912-4410 has a spin period of 5.32 min and is part of a compact binary with an M4.5 dwarf companion with a binary period of 4.03 hr. Unlike AR Sco (the first white dwarf pulsar) where the radio pulse is not seen directly, the radio pulse profile of J1912-4410 is narrow (~10 s) and well-defined, similar to pulse profiles in neutron star pulsars. In this talk, I will present results from an ongoing monitoring campaign of J1912-4410 with MeerKAT, where we combine the fastest imaging (2-s time resolution) with the pulsar timing mode on MeerKAT (PTUSE) to track the spin evolution of the white dwarf and study the nature of the pulsed emission in white dwarf pulsars.

Uncovering the diversity of fast radio bursts (11:15 AM, 15 minutes)

Presenter: Ziggy Pleunis (University of Amsterdam / ASTRON)

Fast radio bursts (FRBs) are millisecond-duration extragalactic radio transients of elusive origin that were first discovered in 2007. They are unique probes of the density and magnetization of the interstellar and intergalactic media and they will be even more useful when we better understand their sources, emission and environments. A small fraction of FRBs has been observed to repeat, which has ruled out a cataclysmic origin for these sources and allows for detailed multi-wavelength follow-up observations that constrain FRB models. It is as-of-yet unclear whether all FRBs repeat and if FRB models based on a few well-studied repeaters can be extrapolated to the full population. Canada's CHIME telescope has been instrumental in uncovering the diversity of FRBs: it provided the first statistical sample of FRBs and it discovered the vast majority of the repeating sources by revisiting the Northern sky every day for the last four years. I will present the differences between repeaters and apparent nonrepeaters that have emerged, with a focus on observations from CHIME/FRB, and I will discuss how the differences can/cannot be reconciled with one population of FRBs.

Stable tertiary mass transfer in hierarchical triple stars (11:30 AM, 15 minutes)

Presenter: Floris Kummer (University of Amsterdam)

Mass transfer between stars is known to be of crucial importance in the evolution of multi-star systems, and is linked to the formation of a vast zoo of observed energetic transients. While mass transfer in binary stars has been studied intensively over the past decades, theoretical work on mass transfer in triples is still in its infancy. Understanding the disparities between mass transfer dynamics in binaries and triples holds particular significance for massive stars, given the prevalence of triple and higher-order multiple star configurations among them. Hierarchical triple star systems, characterized by a binary accompanied by a third star (referred to as the tertiary) orbiting at a greater distance, present intriguing scenarios. Under certain initial conditions, the tertiary star may fill its Roche lobe and initiate mass transfer before any member of the binary. In this talk, I will introduce an analytical model tailored to simulate the transfer of mass from the tertiary star onto the binary, while explaining the underlying physical processes. Specifically, I will explore the implications of this mass transfer phenomenon on the orbital evolution of the binary, with potential consequences including gravitational wave mergers. This talk aims to provide insights into the complex dynamics of mass transfer within triple star systems, highlighting its importance in our understanding of stellar evolution.

X-ray diagnostics of Cassiopeia A's "Green Monster" (11:45 AM, 15 minutes)

Presenter: Manan Agarwal (University of Amsterdam)

The core-collapse supernova remnant, Cassiopeia A (Cas A), is the youngest galactic remnant (~350 yrs) and is amongst the closest known (~ 3.4 kpc). Moreover, it has a secure supernova classification using light echo spectroscopy analysis. These make it an ideal source for studying supernova explosion mechanisms and progenitor systems. The recent James Webb Space
Telescope (JWST) survey using its MIRI instrument has revealed a large structure in the interior region of Cas A, referred to as the "Green Monster''. Although its central location suggests an ejecta association, the infrared properties of the "Green Monster" hint at a circumstellar medium (CSM) origin. We present the analysis of X-ray properties of emission of this region using the archival Chandra X-ray Observatory data. We extracted spectra along the "Green Monster" as well as from shocked CSM regions. Both the extracted spectra and a principal component analysis show that the "Green Monster" emission properties are similar to those of the shocked CSM. We employ a Bayesian scheme to fit the spectra with a model consisting of a combination of a non-equilibrium-ionization model and a power-law component, modified by Galactic absorption. All the "Green Monster" spectra show a blueshift corresponding to a radial velocity of around −2300 km s−1, suggesting that the structure is on the near side of Cas A. The ionization age is around net ≈ 1.5 × 10^11 cm−3 s. This translates into a pre-shock density of ~ 12 cm−3, higher than previous estimates of the unshocked CSM. The relatively high net and relatively low radial velocity suggest that this structure has a relatively high density compared to other shocked CSM plasma. The infrared and X-ray properties of the "Green Monster" provide yet another piece of evidence that the CSM around Cas A's progenitor was not that of a smooth steady wind profile. This will help to reconstruct the mass-loss properties of the progenitor star.

Lunch – Restaurant (12:00 PM - 1:30 PM)

Plenary session - Lamoraal-room (1:30 PM - 3:00 PM)

Invited "meet-new-staff": XRISM early results and scientific impacts (1:30 PM, 15 minutes)

Presenter: Liyi Gu (SRON)

In September 2023, the XRISM X-ray mission was successfully launched. It is built upon a major collaborative effort between Japan and US, with significant participation from Europe including the Netherlands. In this talk I will show its first light observations and early-releasing data, providing insight into revolutionary scientific breakthroughs that promise to reshape the landscape of X-ray astronomy.

Witnessing radiatively-driven ionised outflows in active galactic nuclei (1:45 PM, 15 minutes)

Presenter: Anna Juranova (SRON / University of Amsterdam)

Most active galactic nuclei show outflows of ionised gas, but the driving force behind their acceleration is rarely identified, hindering our understanding of the complex processes at play. Here, we present new insights into the outflows of I Zw 1, a nearby quasar-like galaxy. From multi-wavelength spectra, we identify line-driving as an important mechanism propelling the ionised gas. The rich dataset further allows us to map the properties and the geometrical structure of the outflows and suggest a link to the broad-line region, which appears as a collimated outward flow. This detailed picture of I Zw 1 offers unprecedented insight into the geometry and physical processes within this local, scaled-down version of distant quasars. Understanding these winds is crucial for revealing the role of supermassive black holes in shaping the chemical and structural evolution of the Universe.

The properties of pre-main sequence stars in the massive Galactic star formation region NGC 3603 with JWST NIRSpec. (2:00 PM, 15 minutes)

Presenter: Ciaran Rogers (Leiden University)

The majority of stars form in clusters that contain at least one massive star. Massive stars dominate the radiation field and dynamics of the cluster, but the exact impact they have on star formation is unclear. We have obtained JWST NIRSpec spectra of 100 stars in the massive Galactic star forming region NGC 3603 using the micro shutter array in high resolution mode. The targets consist of young and old pre-main sequence stars, along with main sequence stars. The spectra exhibit a rich variety of absorption and emission lines that we have used to determine spectral type, metallicity, and the accretion luminosity in the case of the pre-main sequence stars. The majority of the stars appear to exhibit sub-solar metallicity, based on best fitting Phoenix stellar models. We have found evidence of stars still accreting material with ages of more than 10 million years, contrary to what is expected in an environment with such harsh UV radiation from the massive stars. We detect Paschen alpha strongly in emission in many cases. This line has rarely been studied spectroscopically, due to its inaccessibility from the ground. We have derived the first empirical relationship between Paschen alpha and the accretion luminosity of pre-main sequence stars. We detect CO bandhead emission in a number of sources and see evidence that high levels of accretion scales inversely with CO bandhead equivalent width, in agreement with current models. Among the CO bandhead emitters, we see evidence of multiple hydrogen line emission mechanisms, from the highly broadened line widths in the Pfund series compared to the Brackett series. We have also simultaneously obtained 600 nebular spectra, and have derived the extinction properties towards NGC 3603 based on the Brackett decrements of the nebular emission spectra.

Weighing Herbig disks: Obtaining gas and dust masses of Herbig disks using millimeter interferometer observations (2:15 PM, 15 minutes)

Presenter: Lucas Stapper (Leiden University)

In the past decade many population studies have been performed with the Atacama Large Millimeter/submillimeter Array (ALMA) to understand the bulk properties of planet-forming disks around young stars. These population studies mostly consist of late spectral type (i.e., G, K & M) stars, with relatively few intermediate mass Herbig stars (spectral types B, A, F). With GAIA updated distances, now is a good time to use ALMA archival data to do a Herbig disk population study, an important step towards understanding the planet formation puzzle, as Herbig disks are the progenitors of directly imaged exoplanetary systems such as HR 8799 and Beta Pictoris, and massive exoplanets are optimally forming around these intermediate mass stars. For a significant fraction of all known Herbig disks up to Orion, ALMA Band 6 or 7 archival data is available to determine the dust and gas masses and sizes. In this talk I will show how Herbig disk masses compare to disks around lower mass T Tauri stars. We find that Herbig disks are massive and both the dust mass and radial extent are larger when compared to the disks around lower mass stars. Additionally, using the thermochemical code DALI, we find that the gas masses based on CO isotopologue observations are consistent with an ISM gas-to-dust ratio of 100, which is in contrast to T Tauri disks for which CO is missing above the amount that is expected to freeze out in these colder disks, lowering the inferred gas-to-dust ratio. Herbig disks are an as of yet overlooked part of planet formation, obtaining complete samples are vital to our understanding of high mass planet formation.

Results and recommendations from the work climate survey (2:30 PM, 30 minutes)

Presenter: Ilse van Bemmel (JIVE / ASTRON)

At the start of 2024 the first ever Dutch astronomy work climate survey was held. This was initiated in 2023 by the Astronomy Round Table, NAIEC and the Astronomy Council, and executed by Ipsos. After the analysis by Ipsos the NAEIC survey team has been developing a set of recommendations, in collaboration with the local Equity and Inclusion committees. In this presentation I will present the main findings of the survey, as well as the recommendations that are being considered.

Coffee + Poster Session - Lounge (3:00 PM - 3:30 PM)

Parallel sessions (3:30 PM – 5:00 PM)

Early Career Researchers Event – Lamoraal-room (3:30 PM - 5:00 PM)

This Early Career Researcher Event is organised by Giovanna Pugliese, Tuomo Salmi, and Dany Vohl. This Event is aimed at MSc students, PhD students and Postdocs to learn more about their possible career paths and challenges they might face inside and outside academia. The ECR Event hosts three speakers with a background in Astronomy, currently inside or outside of academia: Ilse van Bemmel: Project scientist at Joint Institute for VLBI ERIC. Stefania Giodini: Manager at the Dutch Red Cross ("water, climate and environment") Marcel Haas: Assistant professor of data science in population health at the Leiden University Medical Center at the Health Campus in The Hague. After these talks, the participants and speakers have time to chat with each other during coffee and cookies.

ECR Speaker: Stefania Giodini (3:30 PM, 20 minutes)

Stefania Giodini is senior technical advisor on Data & Climate at the Red Cross Red Crescent Climate Centre, where she leads the Data and Digital team at the Netherlands Red Cross for the last 5 years. She has a broad technical profile (physics, data, technology, climate) and manages technical teams (both in person and remotely). She has a PhD in Astrophysics <from which Uni?> and experience working both in academic and commercial & non-profit environments in close contact with clients. Since 2022 she has led the Water Advisory team at the Netherlands Red Cross that provides technical & strategic support on Climate Water and Environmental projects in the humanitarian space.

ECR Speaker: Marcel Haas (3:50 PM, 20 minutes)

Marcel Haas is assistant professor of data science in population health at the Leiden University Medical Center. He did BSc and MSc in Astronomy in Utrecht and graduated on an observational MSc thesis on star clusters in the Whirlpool Galaxy. His PhD in Leiden focused on properties of synthetic galaxy populations in cosmological simulations. Then he did two postdocs in the United States of America, focusing on synthetic observations created from simulations that aided HST, JWST and MeerKAT observational planning or interpretation, again based on theoretical and numerical models of galaxies. He switched to data science in 2013, moving back to the Netherlands and became an "extronomer". He set up a data science team at healthcare insurance provider, where he also did work on business intelligence and fraud detection. After 5 years he went on to a position as senior consultant and data science trainer, where he focused both on technical (building data science products) as well as strategic (advising managers and board rooms on how to organize their data science activities) consulting. He also worked as lead data scientist at the business intelligence department of the University of Amsterdam.

ECR Speaker: Ilse van Bemmel (4:10 PM, 20 minutes)

Ilse van Bemmel is a Project Scientist at JIVE, and Project Manager at ASTRON in Dwingeloo. She got her PhD in astronomy from Groningen in 2002, was an ESA fellow at the Space Telescope Science Institute from 2003 to 2005, and a post doc in Leiden from 2006 to 2010. Before joining JIVE, she worked at ASTRON for 4 years as an astronomer and deputy project scientist on the SKA aperture array design studies. Her scientific interests range from active galaxies to hardware technology and user software development. She was co-lead of the calibration team in Event Horizon Telescope when it produced the first image of a black hole shadow, and she coordinated the development of the CASA VLBI tools, which included the organisation of the CASA VLBI schools. Her work in JIVE focuses on calibration of radio interferometry observations, instrument simulations, and astrophysics of active galaxies. Within ASTRON she is the project manager for the central processing cluster replacement for the LOFAR2.0 upgrade. She is a key member of the NAEIC, The Netherlands Astronomy Equity and Inclusion Committee, and lead of the recent astronomy work climate survey.

Informal Chat (4:30 PM, 30 minutes)

Strategy & Updates Meeting – Room 558 (3:30 PM - 5:00 PM)

Sera Markoff will talk about the NWO Astronomy Round Table. Joseph Callingham will talk about the SKA Construction and Development of the Regional Centre in the Netherlands.

NWO Astronomy Round Table Updates (3:30 PM, 30 minutes)

Presenter: Sera Markoff (University of Amsterdam)

NWO has for many years now a system of communicating with the various fields via Round Tables, one per discipline. Since 2023 the Round Tables not only advise NWO but also have been given a budget of 80k€ annually, for community organisation. In this talk we will give several important updates from the Astronomy Round Table, announce the next Community Town Hall day and format, and explain the 2024 budget and process for the 2025 budget call for ideas.

SKA Construction and Development of the Regional Centre in the Netherlands (4:00 PM, 15 minutes)

Presenter: Joseph Callingham (ASTRON)

After more than 30 years of talking, the construction of the Square Kilometre Array (SKA) is now well underway. In this talk, I will give a update on construction, discuss how anyone can get involved in the SKA now, and what this stage of project development means for the Dutch astronomy community. In particular, I will focus on the establishment of our own regional centre, and its expected role in the community. NAC is the ideal forum to present this information considering the community investment in the project and the current important developmental stage the SKA.

Raad van de Astronomie / NL Astronomy Council; Update (4:30 PM, 30 minutes)

Presenter: Carsten Dominik (University of Amsterdam)

Carsten Dominik will give an update on the Raad van de Astronomie.

Astronomy Communication Meeting – Room 559 (3:30 PM - 5:00 PM)

Futureproof Astronomy Communication (3:30 PM, 15 minutes)

Presenters: Marieke Baan and Joanna Holt (NOVA Information Center)

In this talk we will give an overview of the mission and ambition of the NOVA Information Center (NIC). First, we will discuss the changing (social) media landscape. What is the impact on engaging the public and communicating astronomy with the press? How can we improve our astronomy communication and make it more targeted? In the second half of the talk, we will discuss NOVA-NIC's ambition to reach out to every school child in the Netherlands with their most successful educational project: the mobile planetariums. With a grant, a sponsorship, and a new collaboration, the aim is to make this project inclusive in the next five years.

Astronomy Communication (3:45 PM, 1h 15m)

The rest of this parallel session will be hosted by Marieke Baan.

KNA/RNAS Business Meeting – Lamoraal-room (5:00 PM - 6:00 PM)

Dinner – The Ritz (6:00 PM - 8:00 PM)

Social events – The Ritz / Bowling / Pub O'Donnell's (8:00 PM - 10:00 PM)

Free time - Bar open - Pub O'Donnell's (10:00 PM - 12:00 AM)

Wednesday, May 15, 2024

Breakfast – Restaurant (07:30 AM – 09:00 AM)

Plenary session - Lamoraal-room (9:00 AM - 10:15 AM)

Invited "meet-new-staff": The first inroads into the low-frequency gravitational wave spectrum (9:00 AM, 15 minutes)

Presenter: Aditya Parthasarathy (ASTRON)

Supermassive black holes at the centres of merging galaxies are expected to form binary systems whose orbital motion generates gravitational waves. A cosmological population of such systems combine to build up a gravitational wave background (GWB). A significant detection of this GWB will provide the first stringent constraints on the dynamical evolution of supermassive black holes and their host galaxies while also providing a tantalising probe into the properties of the early Universe. Searches for the GWB have typically used sensitive radio telescopes around the world which observe an ensemble of extremely stable millisecond pulsars to probe the characteristics of the GWB signal. In this talk, I will discuss the first compelling evidence of the GWB seen by global pulsar timing array (PTA) collaborations, its scientific impact, potential biases and the road ahead. Focussing on future advancements, I will talk about the powerful potential of a gamma-ray PTA and how it can improve our understanding of the astrophysical origins of the GWB.

Unveiling the structure of the Jhelum stream with ant colony-inspired computation (9:15 AM, 15 minutes)

Presenter: Petra Awad (University of Groningen)

The halo of the Milky Way galaxy hosts multiple dynamically coherent substructures known as stellar streams that are remnants of tidally disrupted orbiting systems such as globular clusters (GCs) and dwarf galaxies (DGs). A particular case is that of the Jhelum stream, which is known for its unusual and complex morphology. Using the available data from the Gaia DR3 catalog, we extracted a region on the sky that contains Jhelum, and fine-tuned this selection by enforcing limits on the magnitude and proper motion of the selected stars. We then applied the novel Locally Aligned Ant Technique (LAAT) on the position and proper motion space of stars belonging to the selected region to highlight the stars that are closely aligned with a local manifold in the data and the stars belonging to regions of high local density. We find that the overdensity representing the stream in proper motion space is composed of two components, and show the correspondence of these two signals to the previously reported narrow and broad spatial components of Jhelum. We then made use of the radial velocity measurements provided by the S5 survey and confirm, for the first time, a separation between the stars belonging to the two components in radial velocity. We show that the narrow and broad components have velocity dispersions of 4.84 km/s and 19.49 km/s, and metallicity dispersions of 0.15 dex and 0.34 dex, respectively. These measurements, as well as the given difference in component widths, could be explained with a probable scenario where Jhelum is the remnant of a GC embedded within a DG and where both were accreted onto the Milky Way during their infall. Although the properties of Jhelum could be explained with this merger scenario, other progenitors of the narrow component remain possible such as a nuclear star cluster or a DG. To rule these possibilities out, we would need more observational data of member stars of the stream. Our analysis shows that the internal structure of streams holds great information on their past formation history, and therefore provides further insight into the merger history of the Milky Way.

Search for a spectral cut-off and periodic signal from a radio brown dwarf binary (9:30 AM, 15 minutes)

Presenter: Timothy Wing Hei Yiu (ASTRON)

Brown dwarfs display Jovian auroral phenomena such as coherent radio emission, which is a probe of magnetospheric acceleration mechanisms and allows us to directly measure the emitter's magnetic field strength. Radio observations of the coldest brown dwarf are particularly interesting since their magnetospheric phenomena may be very similar to those in gas-giant exoplanets. Here, we present the radio data of J1019, a brown dwarf binary, from 3 different telescopes. From these observations, we shall show that J1019 exhibits pulsed coherent emission that repeats on hour-timescale and present our latest efforts to find a cut-off in J1019's radio spectrum to directly measure its B-field strength. Additionally, the fact that J1019 is in a binary implies that we can constraint its mass, which allows us to (a) test dynamo scaling theories which predict the B-field strength of brown dwarfs/gas-giant exoplanet, and (b) study magnetospheric interactions which may be powering J1019's radio emission.

A periodic radio transient found with LOFAR (9:45 AM, 15 minutes)

Presenter: Iris de Ruiter (University of Amsterdam)

In this talk, I will discuss a new radio transient that we found in a commensal transient search of the LOFAR survey data (de Ruiter et al. 2023, submitted). The source has shown several bright minute-duration radio flares with a periodicity of two hours.
Long-period radio transients are an emerging class of extreme astrophysical events of which currently only three are known (Caleb et al. 2022, Hurley-Walker et al. 2002, Hurley-Walker et al. 2023). Both magnetic white dwarfs and magnetar, in isolation or in binary systems, have been invoked to explain these types of objects. However, there is no consensus on the progenitor for this type of emission. Our transient seems to fit with this long-period radio transient source class in a lot of aspects. However, in contrast to the previous detections, our transient lies far off the galactic plane and has an optical counterpart. This potentially confirms that this type of emission could originate

from compact object binaries. This talk will be a broad description of the source, including the radio and multi-wavelength follow-up observations and the conclusions we can draw about the progenitor system.

Invited “meet-new-staff”: The need for ab initio and laboratory simulations in exoplanet science (10:00 AM, 15 minutes)

Presenter: Kaustubh Hakim (KU Leuven / Royal Observatory of Belgium)

Mass-radius measurements of exoplanets over three decades have revealed three major classes based on bulk composition. This decade is witnessing a significant shift from the atmospheric characterisation of gas giant exoplanets to their smaller counterparts, sub-Neptunes and rocky exoplanets. While the observations of atmospheres of sub-Neptunes and rocky exoplanets keep growing, the understanding of planetary interiors and interior-atmosphere interactions is more vital than ever. I will discuss the role of exoplanet interiors on atmospheric composition, including processes such as geochemical cycling and outgassing. I will demonstrate why ab initio simulations and laboratory experiments are required to go beyond the physicochemical parameter space of solar system planets to understand the physically and chemically diverse exoplanets. I will give examples of the impact of extrapolations of the knowledge of solar system planets to exoplanets.

Poster Prize Ceremony - Lamoraal-room (10:15 AM - 10:30 AM)

Coffee + Poster session - Lounge (10:30 AM - 11:00 AM)

Plenary session - Lamoraal-room (11:00 AM - 12:30 PM)

Invited “meet-new-staff”: The polydisperse nature of Planet Formation (11:00 AM, 15 minutes)

Presenter: Sijme-Jan Paardekooper (TU Delft)

Planets form in discs of gas and dust around young stars. Within these discs, solid particles have to grow 12 orders of magnitude to form terrestrial planets. This process is never going to be 100 percent efficient at all times, so that there will always be a distribution of sizes in solids. The dynamics of a mixture of dust sizes, coupled to the gas through friction, can be complex and non-intuitive. In some cases, having a size distribution can seriously hinder planet formation, but on the other hand this offers exciting links to observations of Solar system objects.

GRMHD simulations of accreting neutron stars (11:15 AM, 15 minutes)

Presenter: Pushpita Das (University of Amsterdam)

Numerical modeling of accreting millisecond X-ray pulsars (AMXPs) allows us to understand the physical origin of different observational signatures detected from these systems. Since the birth sites of these signals are strongly affected by the gravitational potential of the star, magnetohydrodynamic (MHD) simulations in full GR (GRMHD) are essential to accurately capture space-time curvature effects and inherent variations in the X-ray spectra. In this talk, I will be showing results from 3D GRMHD simulations of accreting neutron stars with oblique magnetospheres. I will be discussing the pulse profiles generated from the GRMHD simulations and their impact on M-R inference for the accreting sources. Apart from the surface features, AMXPs are also good candidates for studying neutron star jet formation. Though there have been extensive investigations into black hole jet formation, neutron star jets remain highly unexplored. Our 2D axisymmetric study in the quiescent regime suggests that the thick disk collimates the initial open stellar flux, leading to jets like the Blandford-Znajek mechanism proposed for black holes. However, much remains to be done before we can draw a complete picture of jets launched from neutron stars. 3D GRMHD simulations of accreting neutron stars allow us to explore neutron star jet formation mechanisms in detail for the very first time.

Dynamics of disk galaxies: what causes the spirals? (11:30 AM, 15 minutes)

Presenter: Sven de Rijcke (Ghent University)

As young children explore the world around them, they quickly discover that a lot can be learned about a complex system by gently poking it and observing how it reacts to that. Astronomers who are interested in the internal workings of disk galaxies, such as our Milky Way, also follow this approach. In this case, nature does the poking for us. The stellar and gaseous disks of galaxies are continuously perturbed by orbiting globular clusters and dark-matter substructures, molecular clouds, the graininess of the stellar density distribution, stellar feedback, encounters with other galaxies, etc. Galactic disks respond to these perturbations by developing spiral-shaped patterns, composed of a spectrum of growing and damped eigenmodes. In this talk, I review my work of the last few years (Fiteni, De Rijcke, Debattista, Caruana 2024; De Rijcke, Fouvry, Pichon 2019; De Rijcke, Fouvry, Dehnen 2019, De Rijcke & Voulis 2016), aimed at gaining insights into the intricate dynamics underlying the spiral patterns of disk galaxies. I show how dynamical theory is a powerful tool that has the unique ability to help us understand the properties (morphology, kinematics, lifespan, ...) of spiral patterns observed in N-body simulations (a crucial first step towards understanding spirals in real galaxies). I highlight the surprisingly important role played by weakly damped modes in driving the secular evolution of galaxies.

Mg abundance of the globular cluster NGC2419 using WEAVE (11:45 AM, 15 minutes)

Presenter: Mariya Nizovkina (Radboud University)

Chemical abundances of globular clusters (GCs) are a powerful tool to investigate the history of their and their host galaxy's formation. These can be measured with integrated-light (IL) spectroscopy with a precision of 0.01 dex. However, the abundances of Mg in the spectra of the Milky Way (MW) and extragalactic GCs show deviation compared to the abundances of alpha-elements. These anomalies are linked to internal abundance spreads in GCs and pose challenges for IL analysis. We observed the MW globular cluster NGC2419, known to have extreme Mg abundance variations, with the recently deployed WEAVE Large Integral Field Unit with spectral resolution of R ~ 10 000. WEAVE is a multi-object fiber spectrograph installed on the William Herschel Telescope, and it can simultaneously obtain up to a thousand spectra. We derived the Mg abundances from the IL spectrum and from individual stars using 3D spectroscopy, and compared the results.

Dust destruction by supernova blast waves in a turbulent interstellar medium (12:00 PM, 15 minutes)

Presenter: Tassilo Scheffler (University of Ghent)

Core-collapse supernovae are one of the main producers of cosmic dust. Their remnants incorporate the perfect conditions for molecules to grow to dust grains, starting from a few hundred days after the explosion. However, the produced 0.01 to 1 solar masses of dust per supernova will eventually encounter the energetic reverse shock, while an even larger amount of pre-existing interstellar dust is at risk of destruction by the forward shock. Numerical studies estimate that the total dust destruction of the forward shock ranges somewhere between 0.3 to 70 solar masses, possibly turning supernovae into dust sinks rather than dust sources. In the last decades, the importance of constraining the dust destruction rate of supernova remnant shocks has become even more pressing since other dust sources such as asymptotic giant branch stars alone cannot explain observations of dusty galaxies at high redshift. To realistically study the destroyed interstellar dust mass of forward shocks, we perform new high-resolution 3D supernova remnant simulations with AREPO and the dust post-processing code PAPERBOATS, which includes various dust transport and destruction processes. Unlike previous studies, we consider several complex phenomena simultaneously: sputtering, grain-grain collisions, magnetic fields, and a turbulent surrounding interstellar medium that closely resembles observations and can lead to significant dust shielding in dense filaments. The supernova, which is then induced into the system, develops highly asymmetric forward and reverse shocks, similar to observations of young supernova remnants such as Cassiopeia A. By covering a wide parameter space of different dust grain species, interstellar medium densities, turbulence strength, temperatures, and magnetic field strengths, we are able to constrain the actual amount of dust destroyed by the forward shock, depending on the properties of the supernova explosion site.

Invited "meet-new-staff": Unveiling the photochemical evolution of carbonaceous molecules: experimental and theoretical studies. (12:15 PM, 15 minutes)

Presenter: Alessandra Candian (University of Amsterdam)

The new stunning observations delivered by the James Webb Space Telescope are revolutionizing our view of the molecular universe, in particular when it comes to large carbon-containing species such as Polycyclic Aromatic Hydrocarbons (PAHs) and carbon cages. The JWST infrared spectra show a treasure of spectroscopic features that change in response to the physical conditions in the astronomical object and thus speak of active photochemistry shaping the population of carbonaceous molecule [1,2]. The synergies between experiments, quantum chemistry calculations and modelling are fundamental to get insight on the behavior of molecules in the interstellar medium and interpret the observations. In this talk I will present the latest efforts to constrain how the molecular properties of PAHs (such as size and shape) influence their destruction.

Closing remarks by Nathalie Degenaar, Mitchel Stoop & Ralph Wijers - Lamoraal-room (12:30 PM - 12:40 PM)

Lunch – Restaurant (12:40 PM - 1:30 PM)

Meeting adjourn (1:30 PM - 3:30 PM)

Poster Contributions

Betsey Adams: Full release of first-generation Apertif data products

Andrew Allan: Why hasn’t there been more detections of helium escaping from the atmospheres of younger exoplanets?

Hossam Aly: Dust Evolution in Warped Protoplanetary discs

Alessandro Angrilli Muglia: Metal poor stars in APOGEE

Vysakh Anilkumar: Searching for Supermassive Black Hole Binaries with Gaussian Processes

Maria Aslanidou: Expansion rate of the young, oxygen-rich supernova remnant G292.0+1.8

Keith Baka: Escaping Atmospheres - Synthesizing Views

Natacha Barrow: Gamma rays from dark matter spikes in EAGLE simulations

Andrey Baryshev: High Spectral Resolution for FIRSST

Samantha Berry: The impact of radiative processes on electron thermodynamics in accretion disk around M87*

Apoorva Bhatia: Detection of Helium and Water in V1298 Tau c

Sanne Bloot: Catching the wisps: constraining mass-loss rates of cool stars at low frequencies

Erik Bootsma: The potential of X-ray interferometry

Stefanie Brackenhoff: Beyond the Beam Model: Direction-Dependent Calibration Challenges Far from the Phase Center

Caspar William Bruenech: Massive triples on the edge of stability

Alessandra Candain: Origin Interspecial: teaching interdisciplinary skills using astrobiology

Chloe Cheng: New clues to assembly history: Exploring age and metallicity gradients in quiescent galaxies over cosmic time with LEGA-C and JWST

Cristina-Maria Cordun: Hide and seek: Hunting for hot Jupiters at decameter wavelengths

Paula Cáceres Burgos: Merger rates predictions of Black Hole binaries under a JWST scope

Qinyang Dong: ZTFJ222052.10+331451.07: Did the eclipsing WD-RD binary come from a common envelope or stable mass transfer?

Bas Dorsman: Pulse Profile Modeling of Synthetic SAX J1808

Billy Edwards: Towards Meticulous Population Studies of Exoplanetary Atmospheres

Abdissa Tassama Emana: Galaxy morphology as a test of galaxy evolution models.

Krishna Nivedita Gopinath: The Radar Echo Telescope for cosmic rays (RET-CR)

Aniruddh Herle: Understanding the alignment of clusters in the FLAMINGO simulation

Jason Hessels: AstroFlash: exploring fast radio transients

Jason Hessels: LOFAR2.0 - an update on LOFAR's major upgrade

Dante Hewitt: Pinpointing to the lairs of fast radio bursts

Noud Hover: Exploring the winds blown by thermonuclear bursts

Haili Hu: Using the national IT infrastructure at SURF for your research

Jeff Huang: Monitoring Repeating Fast Radio Bursts with Nancay Radio Telescope

Hyerin Jang: Dust analysis of PDS 70 disk observed by JWST-MIRI

Antonios Katechakis: Second Generation Planet Formation Around Double White Dwarf Binaries

David Konijn: Radio search for extrasolar coronal mass ejections.

Elise Koo: ALMA Observations of the Red Rectangle: Searching for Hydrocarbons

Ioannis Koutalios: A cross-power model for power suppression in FLAMINGO

David Krejcik: Improving localization of Fast Radio Bursts using Machnie learning

Joeri van Leeuwen: Observations of FRB20201124A with ALERT and GMRT

Isha Loudon: Investigating the Radar Echo Signal

Maeva Louis: Laboratory astrochemistry: electronic photoabsorption of interstellar functionalized PAHs

Benito Marcote: Zooming into your favourite object at milliarcsecond resolution

Jip Matthijsse: Polydisperse Formation of Planetesimals

Casper Moltzer: Understanding post-RGB binaries through stable mass transfer

Monika Moscibrodzka: Radiative Transfer Coefficients for Relativistic Electrons

Mahdi Najafi-Ziyazi: Loopy Face of Sagittarius A*

Tong Pan: The Environment of Radio Galaxies and Quasars in LoTSS Data Release Two

Theodore Pellegrin: Modeling the Behaviour of Oxygenated PAH Molecules in the ISM

Noa Peters: Investigating the flux anomaly of gravitational-lensed object B0128+437 at 15 GHz

Vanesa Ramirez: Probing the inner depths: a study of the interior complexity of the “ice” giants Uranus and Neptune

Princy Ranaivomanana: Towards ensemble asteroseismology of hot subluminous stars with MeerLICHT and BlackGEM

Benjamin Ricketts: Emulation for x-ray reverberation: faster fitting

Steven Rieder: Simulating stellar winds in binary systems

Jan van Roestel: The BlackGEM telescope array

Karla Rojas-Martinez: The hot accretion disk plasma in the neutron star X-ray binary 4U 1916-053

Lucie Rowland: REBELS with JWST: NIRSpec/IFU observations of metal-rich massive galaxies in the Epoch of Reionisation

Dagmar Rozendal: Multi-messenger follow-up observations using Astro-COLIBRI

Matus Rybak: DESHIMA - a dawn of ultra-wideband spectroscopy at mm-wavelengths

Sophia Schnauck: Gravitational Wave Signals from 3D General Relativistic Magneto-Hydrodynamic simulations of Core-Collapse Supernovae

Biancamaria Sersante: Constraining the Galactic Centre with Hypervelocity Stars

Rahul Silie: Pulse profile property diagnostics as an indicator of mass-radius inference quality

Barbara Siljeg: How lonely are dwarf galaxies?

Benjamin Silk: Dust Size Evolution in Protoplanetary Disks

Rasjied Sloot: Anton Pannekoek Observatory poster

Rob Spaargaren: How rocky planet bulk composition affects atmospheric evolution

Gudmundur Stefansson: An extreme test case for planet formation: a close-in Neptune orbiting a very low mass star

Michael Stroet: Hydrodynamical Simulations of Eccentric Mass Transfer

Katrien Uytterhoeven: Become a programme coordinator at NWO, the Dutch Research Council!

Dany Vohl: Topology of Pulsar Profiles

Beth Westoby: A kinematic study of the ALMA-revealed substructure in dusty star-forming galaxies

Sai Zhai: Extend the extragalactic peaked-spectrum sources to 54 megahertz

Yunhao Zhang: Accurate and Efficient Modeling in Weak Gravitational Lensing Cosmology

Pengpei Zhu: The pair NGC 833/835 as a case study of a gas-rich galaxy interaction