ABSTRACT

CHEN, Lei
Max-Planck-Institut für Radioastromie, Bonn (DE)

Near-infrared interferometric observation of the Herbig Ae star HD144432 with VLTI/AMBER

We present near-infrared interferometric observations of the Herbig Ae star HD144432. The aim of this work is to study the inner AU-scale circumstellar environment of the star-disk system. The observations were carried out with the VLTI/AMBER instrument in the H and K band. We analyzed the obtained: visibilities and the SED of HD144432 with geometric and temperature-gradient disk models. We derived a ring-fit radius of 0.17 ± 0.01 AU in the K band, which approximately agrees with the dust sublimation radius of -0.13 AU predicted by the size-luminosity relation. We found an additional extended halo component to be required in both the geometric and temperature-gradient modeling. In the best-fitting temperature-gradient model, the disk has two components. The inner part of the disk is a thin ring at an inner radius of -0.22 AU, with a temperature of -1500 K, and a ring thickness -0.02 AU. The outer part extends from -1 AU to -10 AU, with an inner temperature of -400 K. We found the disk to be nearly face-on with an inclination angle < 23○. The NIR excess is dominated by emission from material located at the dust sublimation radius as predicted by the size-luminosity relation. An extended halo component contributes -7% to the total NIR flux. The MIR emission has a bimodal distribution, with -20% from the inner ring, and the rest from the outer part.

POSTER

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ABSTRACT

COOPER , Jennifer
SETI/Cornell University (US)

A Spitzer-based classification of TNOs

The outer reaches of the Solar System are residence to the icy bodies known as trans-Neptunian objects (TNOs). Implications such as low albedo and size have left this field relatively unexplored and in turn, encouraged the pursuit of these far-orbiting objects. A database of 48 objects was used by Fulchignoni et al. (2008) to cluster, model, and analyze the various spectra into classified taxa. The dataset adopted by Fulchignoni et al. (2008) was used as a baseline for visual colors to which Dalle Ore et al. (in prep) provided the significance of adding albedo measurements taken from Stansberry et al. (2008). To further the classification accuracy, two near-infrared color bands from the Spitzer Space Telescope, centered at 3.55 and 4.50 microns, were supplemented with the previous 7-filter photometry. The 9-band compilation produced altered results from the previous studies; the addition of Spitzer data hopes to distinguish varying compositional properties of icy objects. We present a redefined taxonomy that may uncover clues to evolutionary trends of the TNO population.

POSTER

3

ABSTRACT

CRUZALÈBES, Pierre
Observatoire de la Côte d'Azur, Nice (FR)

Angular diameter estimates of cool giant and supergiant stars with VLTI-AMBER and hints for surface brightness asymmetries

(P. Cruzalèbes, A. Jorissen, S. Sacuto, A. Chiavassa, E. Pasquato, A. Spang, O. Chesneau, and Y. Rabbia) We present the results of 2 years of observation of a sample of 18 cool stars with VLTI-AMBER, obtained within the Belgian guaranteed time on VISA. Carefully calibrated interferometric measurements of visibility amplitudes and closure phases are interpreted in terms of limb-darkened angular diameters, leading to estimation of intensity radii and luminosities. The available interferometric measurements may hold clues for the presence of surface brightness asymmetries in these stars, most probably photospheric convective cells.

POSTER

4

ABSTRACT

CUSANO, Felice
INAF - Osservatorio Astronomico di Bologna (IT)

AMBER/VLTI observations of 5 giant stars

While the search for exoplanets around main sequence stars more massive than the Sun have found relatively few such objects, surveys performed around giant stars have led to the discovery of more than 30 new exoplanets. The interest in studying planet hosting giant stars resides in the possibility of investigating planet formation around stars more massive than the Sun. Masses of isolated giant stars up to now were only estimated from evolutionary tracks, which led to different results depending on the physics considered. To calibrate the theory, it is therefore important to measure a large number of giant star diameters and masses as much as possible independent of physical models. We aim in the determination of diameters and effective temperatures of 5 giant stars, one of which is known to host a planet. We used optical long baseline interferometry with the aim of testing and constraining the theoretical models of giant stars. Future time-series spectroscopic observations of the same stars will allow the determination of masses by combining the asterosimological analysis and the interferometric diameter. AMBER/VLTI observations with the ATs were executed in LR mode on 5 giant stars. In order to measure accurate calibrated squared visibilities, a calibrator-star-calibrator observational sequence was performed. We measured the uniform disk and limb-darkened angular diameters of 4 giant stars. The effective temperatures were also derived by combining the bolometric luminosities and the interferometric diameters. Lower effective temperatures were found when compared to spectroscopic measurements. The giant star HD12438 was found to have an unknown companion star at an angular separation of ~12 mas. Radial velocity measurements present in the literature confirm the presence of a companion with a very long orbital period (P ~ 11.4 years).

POSTER

5

ABSTRACT

DI FOLCO, Emmanuel
OASU, Université Bordeaux (FR)

The inner disk structure of the transition system MWC758 (MIDI+VISIR)

The Herbig Ae star MWC758 is surrounded by a proto-planetary disk, which displays an intriguingly low gas-to-dust abundance ratio (Chapillon et al. 2008) and a cavity in the continuum emission (Isella et al. 2010, Andrews et al. 2011). We will report VLTI/MIDI and VISIR observations of the dust emission in the 10-20micron regime, which constrain (together with the IRS spectrum) the inner disk structure in the planet formation region. We will show that the IR dust emission is typical of poorly evolved disks, in apparent contradiction with the disk dissipation signposts revealed at millimeter wavelengths.

POSTER

6

ABSTRACT

GRELLMANN, Rebekka
Universitäts-Sternwarte München (DE)

Mid-infrared interferometry of the massive young stellar object NGC 2264 IRS 1

NGC 2264 is a young stellar cluster with an age of about 3 Myr, a distance of ~900 pc, and part of the Mon OB1 association. In this cluster we can find numerous embedded protostars, molecular outflows, and Herbig-Haro objects, which is an evidence for ongoing star formation in this region. One prominent site of star formation activity can be found close to the source NGC 2264 IRS 1. IRS 1 was discovered in 1972 by D. Allen (therefore also called Allen's Source) as an infrared source without optical counterpart. It is believed to be a massive, young stellar object (~10 Msun, spectral type B2), located to the North of the extended Cone Nebula. A jet-like structure seen in the K-band is often associated with IRS 1, as well as at least one molecular outflow. PARAGRAPH To understand the nature and complex structure of such young stellar objects, and thus their possible impact on the surrounding material, spatially resolved observations are needed. The required spatial resolution can not be achieved with single-dish telescopes, but only with long-baseline interferometers, such as the VLTI. Our observations with MIDI trace the warm parts (several hundred Kelvin) of the disk, thus can not only provide constraints on the dust distribution in the MIR, but also on the dust composition. We will discuss our recent results of MIDI observations of IRS 1. We find a significant elongated dust distribution, therefore, radiative transfer models for circumstellar disks were employed to jointly model visibilities and spectral energy distribution. We will discuss these modeling results with respect to the overall geometric picture and compare IRS 1 with similar massive young stellar objects.

POSTER

7

ABSTRACT

GRININ, Vladimir
Main (Pulkovo) Astronomical Observatory, St. Petersburg (RU)

Model predictions for spectro-interferometric observables of disks with various geometry and kinematics.

We consider different types of gaseous disk models to compute model predictions of spectro-interferometric observables such as visibilities, differential phases, closure phases, and line profiles measured with high spectral resolution (e.g., AMBER observations with a spectral resolution of 1500 or 12000). We computed interferometric observables of Keplerian disks, accretion and excretion disks, as well as disks with disk wind or biconical outflows. These models allow us to study the dependence of the interferometric observables on the wavelengths within emission lines, the inclination of the disk, and various physical properties of the star-disk system.

POSTER

8

ABSTRACT

HILLEN, Michel
Instituut voor Sterrenkunde, Leuven (BE)

Comparing the CODEX model atmospheres with the PTI spectro-photometric and visibility time series

On this poster, I will present the latest results of our ongoing endeavor to probe the interplay between the pulsating photospheres and the molecular layers around Mira variables. Our dataset is a combination of time series from the Palomar Testbed Interferometer and VLTI snapshots. I will show in particular how the recent publicly released CODEX model atmospheres compare to our spectro-photometry and visibilities. One conclusion we can already draw is that around visual maximum, the current models seem to predict an object that is too small compared to the data.

POSTER

9

ABSTRACT

HIPPLER, Stefan
Max-Planck-Institut für Astronomie, Heidelberg (DE)

The GRAVITY near-infrared wavefront sensors

The GRAVITY instrument will bring near-infrared wavefront sensors to all UT telescopes. Located in the each of the UT's Coudé room they can provide adaptive optics operations for all instruments downstream toward the interferometric lab. We present the actual design of the Coudé Infrared Adaptive Optics (CIAO) hardware including the optical interface to the science instrument. Expected performance numbers and schedule are shown.

POSTER

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ABSTRACT

HRON, Josef
Institute of Astronomy, Vienna (AT)

Surface structure of AGB stars: complementing interferomtry with spectro-astrometry

The bright carbon star TX Psc has been observed by many high-angular resolution techniques, often showing evidence for surface inhomogeneities. In this poster we summarize these measurements and compare them with new spectro-astrometric observations with CRIRES and unpublished MIDI data.

POSTER

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ABSTRACT

KLOTZ, Daniela
Institute of Astronomy, Vienna (AT)

The circumstellar environment of the oxygen-rich star SV Psc probed by mid-infrared interferometry: evidence for a close binary companion?

Asymptotic Giant Branch (AGB) stars are subject to heavy mass loss that is responsible for the formation of circumstellar envelopes. Even though mass loss has been studied for over four decades, many aspects are still poorly understood. A crucial aspect is the spherical/aspherical geometry of the circumstellar envelopes. Double velocity features that are observed in the CO-line profiles of some AGB stars could result from the presence of a disk in (Keplerian) rotation. Because of its high angular resolution, mid-IR interferometry can give strong constraints on the origin of such a disk. The oxygen-rich AGB star SV Psc presents one of the most extreme cases of such a double-component CO-line profile. Observations of SV Psc with the VLTI/MIDI instrument are compared with simple geometrical models in order to check for the presence of a close binary companion that would be responsible for the entrainment of gas and dust into a circumbinary disk.

POSTER

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ABSTRACT

KREPLIN, Alexander
Max-Planck-Institut für Radioastromie, Bonn (DE)

Resolving the circumstellar environment of the B[e] star V921 Sco in the near-infrared with VLTI/AMBER

We study the AU-scale circumstellar environment of the unclassified B[e] star V921 Sco in the near-infrared. For the interpretation of the observations, we employ temperature-gradient disk models. Using the near-infrared beam combiner instrument AMBER, we recorded spectrally dispersed (spectral resolution R = 35) interferograms in the H and K band. To obtain a slightly improved calibration of the visibilities, we developed a method that is able to equalize the histograms of the optical path difference of target and calibrator. We fit temperature-gradient disk models to the visibilities and SED to analyze the circumstellar dust geometry. A geometric ring-fit radius of 2.10 ± 0.16 mas in the K band was derived. If we adopt the distance of 1150±150 pc reported by Borges Fernandes et al. 2007, we obtain a ring-fit radius of 2.4 AU, which is slightly smaller than the 3.5 AU dust sublimation radius predicted by the size-luminosity relation. The fitted H-band radius of 1.61 ± 0.23 mas (1.85 AU) is found to be more compact than the K-band radius. The best-fit temperature-gradient disk model has an inner disk radius of -1.45 AU, an inner-edge disk temperature T = 1533 K, and a temperature-gradient exponent q = 0.46. The distance and luminosity of V921 Sco are not well known. If we assume a distance of 1150 ± 150 pc (Borges Fernandes et al. 2007), we derive a ring-fit radius of -2.4 AU, which is approximately consistent with the computed temperature-gradient disk model with inner and outer ring radii of 1.45 and 8.5 AU, respectively. If the inner radius of V921 Sco is more compact than the sublimation radius, this compact observed size can be explained by emitting material (e. g., a gaseous disk) inside the dust sublimation radius, as suggested for several other B[e] stars.

POSTER

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ABSTRACT

KUDRYAVTSEVA, Natalia
Max-Planck-Institut für Astronomie, Heidelberg (DE)

Characterizing exoplanets with GRAVITY

GRAVITY is the second generation instrument of the VLTI that is designed to work with all four 8-meter Unit Telescopes. With the expected 10 μas astrometric capability GRAVITY will open a new window in a range of planet masses that can be discovered via astrometry. GRAVITY will focus on detecting exoplanets in close binary systems with angular separation smaller than 1.7''. Our target list include solar-type stars within 200 pc from the Sun and M-dwarf binaries within 25 pc. We aim to detect 4 Earth mass planets around M-dwarfs in a 5-year survey. In addition, the GRAVITY instrument will be able to measure the position angle of the planet orbit on the sky by observations of transiting exoplanets. The orbit orientation combined with measurements of the degree of polarization of light reflected by the planet (e. g. SPHERE ZIMPOL observations), will give an opportunity to place constraints on the distribution of clouds and weather zones on the planet.

POSTER

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ABSTRACT

LAZAREFF, Bernard
IPAG - Observatoire de Grenoble (FR)

The Pionier Instrument

This poster presents the innovative aspects of the Pionier instrument: four telescope operation, integrated optics beam combiner, polarization control, non destructive readout, instrument control, integrated data flow. NOTE: this poster is intended to complement, not duplicate the contributed presentation, giving conference participants the opportunity to examine diagrams and graphs at their own pace and leisure.

POSTER

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ABSTRACT

MELLA, Guillaume
IPAG - Observatoire de Grenoble (FR)

Accompanying 10 years of VLTI: the JMMC tools and services

This poster summarizes the main points about the Jean-Marie Mariotti Center which provides software and services for optical interferometry. Its mission and organisation are presented before listing the current software suite. Finally some facts and perspectives are mentioned.

POSTER

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ABSTRACT

MINARDI, Stefano
Friedrich Schiller Universität, Jena (DE)

Advanced photonics technologies for optical interferometry

(S. Minardi, B. Steglum, R. Neuhauser, Th. Pertsch, F. Giessler, L. Labadie, G. Martin, R. Thomson, A. Rodenas, P. Kern, K., Kar A. K.) We review photonic technologies which may find applications for future optical interferometers or upgrades on the VLTI facility. We show the results presented with different technologies and their application to different observing bands of astronomical interest encompassing near and mid-IR wavelengths. We focus in particular on 1) the usage of optical fibers to deliver metrology and/or links for the telescopes and 2) three dimensional photonic components for integrated beam combiners including micro-spectral analyzers, suitable for the combination of an arbitrary large number of telescopes. Possible related science cases are put forward. While this instrumental research is turned towards future interferometers, it relies on more than 10 years of development work with proven scientific return. This certainly reinforces the potential and originality of the approach.

POSTER

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ABSTRACT

PALADINI, Claudia
Institute of Astronomy, Vienna (AT)

A joint venture in the red: the Herschel+MIDI+VISIR view on mass loss from evolved stars

As a large portion of planetary nebulae are asymmetric, it is important to understand how the morphology changes from the onset of mass ejection and the creation of a circumstellar envelope. In this contribution I will present our very recent results obtained applying high angular resolution techniques to investigate the geometry of the mass-loss process in Asymptotic Giant Branch stars. I will focus on the carbon Mira variable R Fornacis. This star shows an apparent change in its pulsation period which could be associated with a change in the mass-loss. The multiperiodic modulation of its light curve suggests an obscuration event. The most likely reason for this obscuration are: an interplay of two dynamic processes, a condensation mechanism in the shell, or an eclipse by dust cloud. Our MIDI observations, through the use of the differential phase, allow us to complete the dynamic picture of this star, putting strong constraints on the morphology of the circumstellar environment. I will conclude giving an overview on the status of our very recent accepted ESO Large Program which aims to study asymmetries in the mass-loss process of AGB stars by combining Herschel, MIDI, and VISIR observations.

ABSTRACT

PRIBULLA, Theodor
Astronomical Institute, Slovak Academy of Science (SK)

Multi-dataset modelling of close binaries with ROCHE

The ROCHE code is devoted to modelling multi-dataset observations of close eclipsing binaries such as radial velocities, multi-wavelength light curves and line profiles (or broadening functions). The code includes spot modelling, eccentric orbits, asynchronous or differential rotation, and third light (or radius and temperature of the third component). The program makes use of synthetic spectra to compute observed UBVRIJHK magnitudes from the surface model and parallax. With big advanced in interferometric techniques it is intended to include interferometric visibility and closure phase as additional observables in comprehensive modelling of close binary stars. This requires transforming 3D models into 2D synthetic images of components in the sky plane and computing Fourier transform. It is clear that including interferometric observables would set more constraints on the determined parameters. Moreover, combining apparent projected major axis from interferometry and from spectroscopy enables model and calibration-independent determination of distance. List of close binaries suitable for long-baseline interferometry is included and the most interesting objects discussed.

ABSTRACT

RENGASWAMY, Sridharan
ESO-Chile

Simulations on Imaging with the VLTI

The capability to relocate the telescopes to different stations within a day, the capability to reconfigure the array during a night and the capability to measure closure phases and differential phases with an instrument like the AMBER at different spectral resolutions, and fast measurements with PIONIER, make the VLTI a unique facility for imaging the stellar surfaces and the circum-stellar environments. Here, I present an imaging simulator that can be used to reconstruct an image from the measured squared visibilities and the closure phases. I demonstrate the method with a few sample reconstructions and the present the limitations. Further, I demonstrate the use of the simulator in modelling closure phases in the case of the carbon rich Wolf-Rayet star WR113, a colliding wind binary and a suspected triple system.

POSTER

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ABSTRACT

SACUTO, Stéphane
Uppsala University (SE)

A possible solution to the mass-loss problem in M-type AGB stars

Mass loss is a fundamental, observationally well-established feature of AGB stars but many aspects of this process still remain to be understood. To date, self-consistent dynamical models of dust-driven winds reproducing the observed mass-loss rates seem only possible for M-type stars if the grains in the close circumstellar environment grow to larger sizes than previously assumed. In order to study the grain size distribution where the mass loss is initiated, high-spatial-resolution interferometry observations are necessary. We have observed the M-type star RT Vir using the VLTI/MIDI instrument to constrain the dust-grain sizes through modeling the 10 micron silicate feature. Results also show that the largest baseline interferometric measurements are good tracers of the inner shock front of the star.

POSTER

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ABSTRACT

SAHLMANN, Johannes
Observatoire de Genève (CH)

PRIMA astrometry data modelling

I will present results obtained from PRIMA astrometry observations carried out during the commissioning of the VLTI dual-feed facility. The aim is to characterise the instrument's performance and to determine its astrometric precision and accuracy, which ultimately has to be sufficient for exoplanet detection. For the purpose of commissioning, I have developed custom data analysis software. I will outline the data reduction, discuss the applied instrumental corrections, and present preliminary results obtained with commissioning data.

POSTER

22

ABSTRACT

TAMBOVTSEVA, Larisa
Main (Pulkovo) Astronomical Observatory, St. Petersburg (RU)

Model predictions for spectro-interferometric observables of disks with various geometry and kinematics.

We consider different types of gaseous disk models to compute model predictions of spectro-interferometric observables such as visibilities, differential phases, closure phases, and line profiles measured with high spectral resolution (e.g., AMBER observations with a spectral resolution of 1500 or 12000). We computed interferometric observables of Keplerian disks, accretion and excretion disks, as well as disks with disk wind or biconical outflows. These models allow us to study the dependence of the interferometric observables on the wavelengths within emission lines, the inclination of the disk, and various physical properties of the star-disk system.

POSTER

23

ABSTRACT

VANNIER, Martin
Laboratoire H. Fizeau, Nice (FR)

Milliradians-accuracy closure phase on AMBER: current results from exoplanets observation program

We present the current achievements and limits of high-accuracy treatment of closure phase with AMBER, from observations made in the last 3 years. The Beam Commutation Device (BCD) is used, and allows to correct a part of the instrumental effects on the closure phase. Unexpectedly, the instantaneous pistons also bias the level of closure phase, and this effect has two be calibrated by a proper fit. These corrections, and a careful selection of the observed frames, yield an accuracy of 2 to 3 milliradians, both on the Science target and on the calibrators. This should allow to detect a companion about 1000 times fainter than the main star, or, more generally, to help model-fitting or image reconstructions for retrieving high-contrast (and/or small scale) structures using corrected closure phases.

POSTER

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ABSTRACT

ENGELS, Dieter
Hamburger Sternwarte (DE)

AKARI and Spitzer observations of obscured AGB and post-AGB stars

The details of the evolutionary transition from the Asymptotic Giant Branch (AGB) to the post-AGB phase are literally "hidden" behind optically thick circumstellar dust, which forms during the phase when stars are observed as obscured Mira variables (OH/IR stars). To study their dust composition, we observed about 200 infrared sources (OH/IR and extreme carbon stars) spectroscopically with the AKARI and Spitzer Space Telescopes between ~2 and ~30μm. All sources are heavily obscured and often detectable only at wavelengths >5μm. The poster focuses on the variety of spectral features distinguishing the stars having O-rich circumstellar shells (silicate absorption features of amorphous and crystalline type) and C-rich shells (C_2H_2 absorption and PAH emission bands), including a number of stars with features from both chemistries. As for several of these sources axisymmetric outflows were detected, the great variety of spectral energy distributions, absorption and emission features, and dust chemistry in the sample is not due to evolutionary effects alone, but also due to geometrical effects. Interferometric observations in the infrared ultimately will be needed to separate the geometric from the evolutionary effects.