General info

Introduction

Welcome to the 58th Dutch Astronomy Conference. This year's conference is special in a number of ways. Not only are we convening in Germany for this first time in years, but also this year's conference is the first to be organised by the Department of Astrophysics of the University of Nijmegen.

On behalf of this young and vibrant Department it is my pleasure to welcome you all to Kleve. I hope this will be a very joyful and 'entertaining' Astronomy Conference.

Enjoy,
Paul Groot

Useful addresses

Parkhotel Schweizerhaus
Materborner Allee 3
D-47533 Kleve
+49 2821 8070

University of Nijmegen
Dept. of Astrophysics
Toernooiveld 1
NL-6525 ED Nijmegen
+31 24 365 2099

This conference was made possible with financial aid from:

The University of Nijmegen
The Netherlands Organisation for Scientific Research NWO
The Leids Kerkhoven-Bosscha Fonds
Kluwer Academic Publishers
Shell

Contents

Programme

Wednesday, May 21

10.30–12.00		Arrival and registration	
12.00–13.00		Lunch	
		Session I	
13.00–13.30	Ⓘ	Maarten de Jong *The ANTARES neutrino experiment*	▷ PAGE 40
13.30–13.50	Ⓒ	Marc Klein-Wolt *High Frequency Features in the 1998 outburst of the microquasar 4U 1630–47*	▷ PAGE 43
13.50–14.10	Ⓒ	Hayley Bignall *Interstellar scintillation of PKS 1257–326*	▷ PAGE 21
14.10–14.30	Ⓒ	J.P. Macquart *High brightness temperature emission from IDV quasar J1819+3845*	▷ PAGE 52
14.30–15.00		Coffee, tea & poster break	
		Session II	
15.00–15.20	Ⓒ	Nigel Douglas *PN Observations of (no) dark halos*	▷ PAGE 28
15.20–15.40	Ⓒ	Pui Kei Fung *Free Electron Laser in the Pulsar Magnetosphere*	▷ PAGE 29
15.40–16.00	Ⓒ	Nissim Kanekar *HI at high redshift*	▷ PAGE 41
16.00–16.20	Ⓒ	Ralph Wijers *Emission lines from GRB hosts: star formation or burst radiation?*	
16.20–16.40	Ⓒ	Dirk Callebaut *Generalization of Planck's Law for Plasmas*	▷ PAGE 26
16.40–17.10		Coffee, tea & poster break	
17.10–18.30		Plenary session *Primary School Projects*	
18.45–20.15		Dinner	
20.15–		Evening programme	

Ⓘ Invited speaker Ⓒ Contributed speaker Ⓝ NOVA speaker Ⓔ Evening speaker

Thursday, May 22

7.00 – 8.45		Breakfast
		Session III
9.00 – 9.30	Ⓘ	René Rutten ▷ PAGE 68 *The future of the Isaac Newton Group of Telescopes*
9.30 – 9.50	Ⓒ	Roy van Boekel ▷ PAGE 22 *On the size and shape of the central object in η Carinae*
9.50 – 10.10	Ⓒ	Conny Aerts ▷ PAGE 15 *Maximum mass-loss rates of line-driven winds of massive stars*
10.10 – 10.30	Ⓒ	Simon Portegies Zwart *de oorstrong ven de kraamkamer in het midden van de Melkweg*
10.30 – 11.00		Coffee, tea & poster break
		Session IV
11.00 – 11.20	Ⓒ	Willem Baan *Low Frequency Array*
11.20 – 11.40	Ⓒ	Thijs van der Hulst ▷ PAGE 35 *Probing HI in the Nearby Universe with the Upgraded WSRT*
11.40 – 12.00	Ⓒ	Maarten Roos-Serote ▷ PAGE 66 *On the water abundance in the atmosphere of Jupiter*
12.00 – 12.20	Ⓒ	Annique Lenorzer ▷ PAGE 48 *The peculiar circumstellar environment of NGC 2024–IRS2*
12.20 – 13.20		Lunch

Ⓘ Invited speaker Ⓒ Contributed speaker Ⓝ NOVA speaker Ⓔ Evening speaker

Session V

13.20–13.50	(I)	Amina Helmi *On the nature of tidal streams and the formation of the Milky Way*	▷ PAGE 33
13.50–14.10	(C)	Amitesh Omar *Gaseous environment near the active nucleaus of Mrk 1 — Kinematics and composition*	▷ PAGE 59
14.10–14.30	(C)	Evert Rol *Polarization of gamma-ray burst afterglows*	▷ PAGE 65
14.30–14.50	(C)	Rob Hammerschlag *Large Open Telescope: size-upscaling from DOT to DOT++ and LOT, technical concepts*	▷ PAGE 31
14.50–15.10		Short coffee & tea break	
15.10–16.10	(N)	Gregory Tucker *The Cosmic Microwave Background and the Wilkinson Microwave Anisotropy Probe*	
16.10–18.45		Coffee & kajaking, cycling or theater sport	
18.45–20.15		Dinner	
20.15–20.30		Poster awards	
20.30–21.30	(E)	Spinoza laureate Henk Barendregt *The Challenges of Computer Mathematics*	
21.30–		Evening programme	

Friday, May 23

7.00 – 8.45		Breakfast
		Session VI
9.00 – 9.30	Ⓘ	Scott Trager ▷ PAGE 75 *Directly measuring galaxy evolution from starlight*
9.30 – 9.50	Ⓒ	Martin van den Akker ▷ PAGE 17 *Search for TeV Gamma-Ray sources with the L3+Cosmics detector at CERN*
9.50 – 10.10	Ⓒ	Harm Habing *Long-period variables in the inner galaxy*
10.10 – 10.30	Ⓒ	Jelte de Jong ▷ PAGE 39 *Probing MACHOs in M31*
10.30 – 11.00		Coffee, tea & poster break
		Session VII
11.00 – 11.20	Ⓒ	Mariano Méndez ▷ PAGE 56 *Mass-to-radius ratio of the neutron star in EXO 0748–676*
11.20 – 11.40	Ⓒ	Huib Jan van Langevelde ▷ PAGE 46 *The parallax of 4 OH maser bearing Mira variables*
11.40 – 12.40	Ⓝ	Bernard Schutz *Gravitational wave detection and radio astronomy*
12.40 – 14.00		Lunch
14.00 –		Scenic route back to Nijmegen by cycle/back home

Ⓘ Invited speaker Ⓒ Contributed speaker Ⓝ NOVA speaker Ⓔ Evening speaker

Abstracts

Legend:

Ⓟ 58 Poster number
Ⓣ T,9.00 Scheduled day and time for talk

All Abstracts

Maximum mass-loss rates of line-driven winds of massive stars

Ⓣ T,9.50

C. Aerts[1], H.J.G.L.M. Lamers[2,3]

1 Instituut voor Sterrenkunde, Katholieke Universiteit Leuven
2 Astronomical Institute Utrecht
3 SRON Laboratory for Space Research, Utrecht

We develop a theoretical treatment that allows us to determine the *maximum* mass-loss rate of a hot rotating star with a wind that is accelerated by radiation pressure due to spectral lines, taking into account finite disk correction as well as the effect of photon tiring. For stars rotating below 80 % of the critical velocity the decrease in the velocity far out in the wind due to the maximisation of the mass loss is negligible. Stars rotating at $> 80\,\%$ of the critical speed have a kinked velocity law connected with the highest possible mass-loss rate. In such cases the wind velocity increases up to typically a few stellar radii, and decreases subsequently almost ballistically outwards. In these cases the terminal wind velocity is much smaller than the maximum wind velocity. For O-type main-sequence stars, the maximum mass-loss rates derived from our formalism are somewhat smaller than those derived for self-regulated line-driven winds including multiple scattering. For B-type supergiants, however, the maximum mass-loss rate is higher by about a factor 1.5–2.

We subsequently investigate the effect of rotation on the maximum mass loss by taking into account the Von Zeipel effect and the oblateness of the star. We determine the maximum mass-loss rate as a function of rotation for a number of relevant stellar models of massive stars. We find that rotation increases the maximum mass-loss rate by a factor four. In particular, the maximum mass-loss rates are always finite, even at the critical rotation velocity. We also find that the dependence of the maximum mass-loss rates on rotation is very similar for all considered stellar models of OB stars. We confront our scaling law for the maximum mass-loss rate as a function of rotation velocity with competing predicted relations available in the literature.

Publication status:

Paper I: accepted for publication in A&A

Paper II: submitted for publication to A&A

Contact and/or more info:

conny@ster.kuleuven.ac.be

http://www.ster.kuleuven.ac.be

Search for TeV Gamma-Ray sources with the L3+Cosmics detector at CERN

Ⓣ F,9.30

M. van den Akker[1], J. Kuijpers[1], C. Timmermans[2]

1 Department of Astrophysics, University of Nijmegen
2 Department of Experimental High Energy Physics, University of Nijmegen

We have investigated the possible presence of highly energetic (TeV) gamma-rays correlated with Gamma-Ray Bursts (GRBs) and Unidentified Gamma-Ray Sources in the 30 keV–30 MeV regime as detected with the BATSE and EGRET instruments on the Compton Gamma-Ray Observatory. Observation of TeV gamma-rays is done indirectly by looking for muons created by such highly energetic photons in atmopheric particle cascades using the L3+Cosmics experiment at CERN.

During the active period of the L3+Cosmics experiment, 8 GRBs that had been detected with BATSE were in the field of view of the L3+Cosmics detector. Three methods have been applied to look for TeV signals from these bursts. Firstly, a search for a significant excess above the muon background was performed using different sampling times. Next, lightcurve information from BATSE was correlated with the muon data, and finally, a spatial analysis was done. Neither method shows a significant muon excess compared to the muon background. This results in an upper limit of the gamma-ray flux at TeV energies of $S_\gamma < 5.4\,\mathrm{erg\,cm^{-2}\,s^{-1}}$ at a 90 % confidence level for the observed GRBs.

Currently we are searching for TeV gamma-ray signals from unidentified gamma-ray sources observed by EGRET. The first preliminary results of this analysis will also be presented.

Contact and/or more info:

martinva@astro.kun.nl

Optical Counterparts to Globular Cluster X-ray Sources

Ⓟ 1

C.G. Bassa[1], F.W.M. Verbunt[1], L. Homer[2], S.F. Anderson[2], D. Pooley[3], and W.H.G. Lewin[3]

1 Astronomical Institute, Utrecht
2 Dept. of Astronomy, Univ. of Washington, USA
3 Center for Space Research and Dept. of Physics, MIT, USA

The Chandra X-ray Observatory has found a large number (~ 250) of X-ray sources in about a dozen globular clusters. These X-ray sources are expected to be binaries, such as low-mass X-ray binaries, cataclysmic variables and millisecond pulsars. These binaries are expected to have played a vital role in the evolution of globular clusters, because they contain a reservoir of (kinetic) energy to counteract the gravitational collapse. Sofar Chandra has been unable to uniquely classify the X-ray sources on the basis of their emission and colors only. However, the high spatial resolution of Chandra has allowed for optical/UV identifications through comparison with HST data. We have developed a method, which can be applied to almost any globular cluster, to align the Chandra and HST frames with each other to within $\lesssim 0.2''$. This allows us to identify many optical counterparts to the X-ray sources and study the nature of the binary population in globular clusters.

Contact and/or more info:

c.g.bassa@astro.uu.nl

Temperature and Cooling Age of the White Dwarf Companion of PSR J0218+4232

Ⓟ 2

C.G. Bassa[1], M.H. van Kerkwijk[2], S.R. Kulkarni[3]

1 Astronomical Institute, Utrecht
2 Dept. of Astronomy and Astrophysics, Univ. of Toronto, Canada
3 Palomar Observatory, California Institute of Technology, USA

We report on Keck optical BVRI images and spectroscopy of the companion of the binary millisecond pulsar PSR J0218+4232. A faint bluish ($V = 24.2$, $B - V = 0.25$) counterpart is observed at the pulsar location. Spectra of this counterpart reveal Balmer lines which confirm that the companion is a Helium-core white dwarf. We find that the white dwarf has a temperature of $T_{\rm eff} = 8060 \pm 150$ K. Unfortunately, the spectra are of insufficient quality to put a strong constraint on the surface gravity, although the best fit is for low $\log g$ and hence low mass (~ 0.2 M$_\odot$), as expected. We compare predicted white dwarf cooling ages with the characteristic age of the pulsar and find similar values for white dwarf masses of 0.19 to 0.3 M$_\odot$. These masses would imply a distance of 2.5 to 4 kpc to the system. The spectroscopic observations also enable us to estimate the mass ratio between the white dwarf and the pulsar. We find $q = 7.5 \pm 2.4$, which is consistent with the current knowledge of white dwarf companions to millisecond pulsars.

Publication status:

Accepted for publication in A&A. (astro-ph/0303439)

Contact and/or more info:

c.g.bassa@astro.uu.nl

http://www.astro.uu.nl/~bassa/work/

Simulations of ultra-relativistic astrophysical flows.

Ⓟ 3

Jeroen Bergmans[1], Bram Achterberg[1], Daniël van Odyck[2], Rony Keppens[3]

1 Sterrenkundig Instituut, Utrecht
2 Centrum voor Wiskunde en Informatica, Amsterdam
3 Instituut voor Plasmafysica "Rijnhuizen", Nieuwegein

Gamma-ray bursts constitute the most energetic events in the observable universe so far. Energy and timescales suggest that the source must be accompanied by an extremely relativistic explosion or jet flow. Relativistic jets are also found in active galaxies and quasars. The structure and behavior of all these objects is characterized by sharp discontinuities or shocks in the flow.

To numerically model these phenomena both accurate representation of the shocks (small scales) as well as the global flow pattern are required. We combine shock-capturing methods for the relativistic fluid equations with an adaptive mesh refinement algorithm to bridge the large range of length scales involved. The first results look promising, we can simulate relativistic blast waves, fireballs, and jets in 1D, 2D, and 3D. The possibilities of including transport and shock acceleration of particles in these flows are investigated.

Contact and/or more info:

J.Bergmans@astro.uu.nl

Interstellar scintillation of PKS 1257−326

Ⓣ W,13.50

H.E. Bignall[1], J.-P. Macquart[2], D.L. Jauncey[3], J.E.J. Lovell[3], L. Kedziora-Chudczer[4], A.K. Tzioumis[3]

1 Joint Institute for VLBI in Europe, Dwingeloo
2 Kapteyn Institute, University of Groningen
3 CSIRO Australia Telescope National Facility, Australia
4 Institute of Astronomy, School of Physics, University of Sydney, Australia

The southern quasar PKS 1257−326 shows rapid variability due to interstellar scintillation at centimetre wavelengths. We have monitored this source over the past two years using the Australia Telescope Compact Array (ATCA), and observed an *annual cycle* in the characteristic timescale of scintillation, due to the effect of the Earth's orbit on the observed velocity of the scattering medium. We have also measured a time delay between the variability pattern arrival times at the ATCA and the Very Large Array. The combined annual cycle and time delay measurements give us information on the geometry of the scintillation pattern, and hence properties of the scattering screen and the source itself, including evolution of source structure on microarcsecond scales. The rapid scintillation appears to be the result of an unusually nearby, localised region of turbulence in the ionized ISM. Although such nearby scattering screens are rare, studies of more common, slowly scintillating quasars can also yield information on microarcsecond source structure.

Publication status:

Bignall et al. 2003, ApJ, 585, 653; Bignall 2003, PhD thesis, University of Adelaide, Australia

Contact and/or more info:

bignall@jive.nl

On the size and shape of the central object in η Carinae

Ⓣ T,9.30

Roy van Boekel[1,2], Pierre Kervella[2], Markus Schöller[1], Tom Herbst[3], Wolfgang Brandner[3], Alex de Koter[2], Rens Waters[2,4], Francesco Paresce[1], John Hillier[5] and Anne-Marie Lagrange[6]

1 European Southern Observatory, Garching, Germany
2 Astronomical Institute "Anton Pannekoek", Amsterdam
3 Max-Planck-Institut für Astronomie, Heidelberg, Germany
4 Instituut voor Sterrenkunde, K.U. Leuven, Belgium
5 Department of Physics and Astronomy, University of Pittsburgh, U.S.A.
6 Laboratoire d'Astrophysique de l'Observatoire de Grenoble, France

η Carinae is the most luminous star known in our galaxy. A violent eruption in the 19th century, during which possibly more than 10 solar masses of material were ejected, created a large bipolar nebula known as the "Homunculus". Presently, η Carinae still has a very high mass loss rate of order $10^{-3}\,M_\odot$/yr, through a dense stellar wind.

We report on high angular resolution observations of the very central core of the nebula at a wavelength of 2.2 μm. We resolve the central object and find a size of 5 milli-arcsec or 11 AU. Comparing our data to models for the ionized wind, we find good agreement for a wind model with a mass loss rate of $1.6\times10^{-3}\,M_\odot$/yr. The emission from the core is found to be elongated, indicating non-spherical mass loss. The "major axis" of the core is aligned with the homunculus, showing the wind density to be highest at the poles, and lower in the equatorial plane.

Publication status:

Submitted

Contact and/or more info:

vboekel@science.uva.nl

Unraveling the Density and Temperature Structure of W 3 IRS 5

Ⓟ 4

Christiaan Boersma[1]

1 Kapteyn Astronomical Institute, Groningen

The topic is high-mass star-forming regions. The aim of the research was to develop and standardize the method for the determination of the density and temperature structure. The test-case and Benchmark for the method is IRS 5, a bright mid-infrared source located at approximately 2.3 kpc in the GMC (Giant Molecular Cloud) W3.

The research is focused on reproducing the SED (Spectral Energy Distribution) from Campbell et al. (1995) of IRS 5. Determination of the temperature and density structure is done by the computer program CSDUST3 from Egan et al. (1985). CSDUST3 is the implementation of the model for radiative transfer in DIDC (Dense Interstellar Dust Clouds) from Leung (1975, 1976b). The data needed for the SED is also taken from CSDUST3.

Since CSDUST3 uses quite extensive and 'unreadable' input and output files, an user interface program, BuI (Boersma user Interface) has been written to overcome this. BuI is also able to create direct graphical representations of some parameters . Standardizing the method for the determination of the density and temperature structure has become answering the question which input parameters to give to CSDUST3.

Publication status:

Small research project

Contact and/or more info:

boersma@astro.rug.nl

http://www.astro.rug.nl/~boersma/

Simulations of Adaptive Optics with a Laser Guide Star for sinfoni

Ⓟ 5

Anthony Brown[1]

1 Sterrewacht Leiden

SINFONI combines integral field spectroscopy and adaptive optics in one instrument intended for use on ESO's VLT (starting in 2004). It is being developed jointly by ESO, MPE and NOVA. Part of the NOVA contribution consists of performing detailed simulations of the adaptive optics (AO) module for SINFONI. These simulations are aimed at assessing the AO module performance, specifically for operations with a laser guide star. Furthermore simulated PSF images will be used to support scientific preparations and the development of an exposure time calculator, while simulated wavefront sensor measurements will be used to study PSF reconstruction methods. In this poster I explain how the adaptive optics simulations work, focusing on the realistic modelling of the laser guide star. The resulting performance of the AO module is discussed together with the necessary future improvements to the simulations.

Publication status:

In preparation

Contact and/or more info:

brown@strw.leidenuniv.nl

http://www.eso.org/instruments/sinfoni/

Nonlinear Stability With Cosmological Constant

Ⓟ 6

D.K. Callebaut[1], G.K. Karugila[1]

1 Phys. Dept., UIA, University of Antwerp, Belgium

A nonlinear Fourier analysis was elaborated and has been applied to various situations in hydrodynamics, MHD and plasma physics. Using *Mathematica* we calculated several higher order terms for an infinite homogeneous gravitating m

edium with cosmological constant Λ in the Newtonian approximation. With analytical or graphical methods we are able to investigate the convergence in the case of oscillations and the nonlinear growth in the case of instabilities. Jeans' criterion

is recovered for Λ approaching zero and physical arguments are given to confirm its validity. Adiabatic and isothermal cases are considered.

Recent results from supernovae used as standard candles have yielded surprising information on the evolution of the universe. This has stimulated again the study of cosmological models with cosmological constant. Yet the analysis here is aimed in the firs

t place at stars and galaxies.

Further extensions may be considered (effect of radiation, using an inhomogeneous equilibrium, ionization and plasma effects, and particularly the Einsteinian approach).

Publication status:

Physica Scripta, to be submitted

Contact and/or more info:

dirk.callebaut@ua.ac.be

geoffrey.karugila@ua.ac.be

Generalization of Planck's Law for Plasmas

Ⓣ W,16.20

D.K. Callebaut[1]

1 Phys. Dept., UIA, University of Antwerp

Starting from basic statistical quantum physics and the dispersion relation $\omega^2 = k^2c^2 + \omega_p^2$ for transverse electromagnetic waves (photons) the black-body radiation in thermal equilibrium is generalized to include the presence o f a homogeneous and isothermal plasma. In the generalized law occurs the parameter $h\omega_p/k_BT$ (conventional notations). Through ω_p the density of the plasma plays a role. In the limit of no plasma Planck's law is recovered.

The generalized law may be derived from a generalization of the Einstein coefficients as well.

The radiation pressure is increased by some 20 % in the center of the Sun. Yet the radiation pressure is there of the order of 10^3 of the plasma pressure. In the center of a White Dwarf the radiation pressure is increased by two orders of magnitude , but again the radiation pressure still represents a tiny fraction of the total pressure. However the main effect may be on the increased energy transport, flattening the temperature in the core and thus influencing the nuclear processes in stars and the neutrino production.

Publication status:

To be published

Contact and/or more info:

dirk.callebaut@ua.ac.be

Carbon chemistry and diffuse interstellar bands in the Magellanic Clouds

Ⓟ 7

Nick Cox[1], P. Ehrenfreund[2], M. Cordiner[3], J. Cami[4], L. Kaper[1], B. Foing[5], P. Sarre[3], T. Snow[6], F. Salama[4]

1 Astronomical Institute, University of Amsterdam, Netherlands
2 University of Leiden, Netherlands
3 University of Nottingham, United Kingdom
4 NASA Ames, United States
5 ESA/ESTEC, Netherlands
6 University of Colorado, United States

To unravel the carbon chemistry prevailing in (diffuse) interstellar clouds we seek to disentangle the different environmental effects that influence the existence and strength of the diffuse interstellar bands (DIBs). DIBs are weak unidentified interstellar absorption bands observed towards reddened stars. Their carriers are presently believed to be large carbonaceous molecules (e.g PAHs). The Large and Small Magellanic Cloud (LMC and SMC) offer a unique opportunity to link DIB behaviour to widely varying environmental conditions (e.g. metallicity, UV radiation field and star formation activity). This in turn imposes useful constraints on the nature of the DIB carrier, which hopefully leads to its much desired identification.

Analysis of the spectra of selected LMC and SMC targets indicates that a delicate balance must exist for DIBs to be present. Noteworthy in this respect is the 30 Doradus region in the LMC in which these special conditions seem to prevail. Of all LMC stars observed, only the two situated in the 30 Dor region have detectable DIBs. This balance appears to be strongly dependent on the UV radiation field.

Publication status:

Paper in preparation

Contact and/or more info:

ncox@science.uva.nl

http://www.astrobiology.nl/

PN Observations of (no) Dark Halos

Ⓣ W,15.00

Nigel Douglas and the PN Spectrograph team

The advance in data-collection power brought about by the construction of the Planetary Nebula Spectrograph in 2001 now allows us to study the outer halos of elliptical galaxies more easily. Our first discovery has been evidence for a population of intermediate-luminosity ellipticals with almost no dark matter.

Free Electron Laser in the Pulsar Magnetosphere

Ⓣ W,15.20

P.K. Fung[1], J. Kuijpers[2]

1 Sterrekundig Instituut Utrecht
2 Department of Astrophysics, Nijmegen

Pulsars have been observed at radio frequencies in great detail since their discovery in 1968. Existing models fail to describe the properties of the observed radio emission, such as the high brightness temperature and the broad spectrum (which

spans a range from about 100 MHz to 30 GHz). Current belief is that the mechanism responsible for the radio emission is related to the creation of a plasma consisting of relativistic electron-positron pairs (Lorentz factor of $\sim 10^2$), above the pul

sar polar cap.

We will discuss the so-called *Free Electron Laser* and its application to the pulsar magnetosphere. In the Free Electron Laser, interaction between a beam of relativistic charged particles and an oscillating electromagnetic field (called 'wiggler')

can lead to amplified radiation. Using numerical simulations, this mechanism is applied to the pulsar magnetosphere. Results for a simple pulsar model are presented.

Publication status:

In preparation

Contact and/or more info:

fung@astro.uu.nl

http://www.astro.kun.nl/index.pl?loc=onderz best/pulsars dut.html

Star cluster disruption in the interacting galaxy M51

Ⓟ 8

M. Gieles[1], N. Bastian[1,2], H.J.G.L.M. Lamers[1,3], R. de Grijs[4]

1 Astronomical Institute, Utrecht
2 European Southern Observatory, Garching
3 SRON Laboratory for Space Research, Utrecht
4 Institute of Astronomy, Cambridge

We obtain mass, age, extinction and radius estimates of star clusters in the interacting galaxy M51. We use broad band observations in 8 different filters with the Hubble Space Telescope from UV to the near infra-red (H) and fit cluster evolution models to the data. The cluster formation rate seems to have been constant for the past 1 Gyr with no evidence for increased cluster formation rate during the last encounter with NGC 5195 (300–500 Myr ago). The cluster initial mass function can be well approximated with a power law with a slope of -1.95, consistent with other studies of young cluster populations. The typical disruption time scale of a 10^4 $M_\odot$ cluster in M51 is between 30 Myr and 100 Myr. To see whether environmental effects influence the disruption time scale, different regions where defined in which the disruption time was determined. Against our expectations, the disruption time scale doesn't seem to depend on the location in the galaxy.

Publication status:

Astronomy & Astrophysics, to be submitted

Contact and/or more info:

gieles@astro.uu.nl

Large Open Telescope: size-upscaling from DOT to DOT++ and LOT, technical concepts

Ⓣ T,14.30

Rob H. Hammerschlag[1], Felix C. M. Bettonvil[1,2], Aswin P. L. Jägers[3]

1 Astronomical Institute, Utrecht
2 ASTRON, Dwingeloo
3 Instrumental Group Physics (IGF), Faculty of Physics and Astronomy, Utrecht

The Dutch Open Telescope (DOT) on the Canary island La Palma consists of a 15 m high open framework tower with an open telescope on top without dome during observations. The wind can blow through the tower and the incoming primary ligh tbeam; it mixes the air and makes the air temperature homogeneous. No warm air bubbles are forced upwards against the closed wall of a tower and no heat is produced by the tower itself. The DOT produces movies over hours with 0.2 arcsec resoluti on. These results prove the value of the open principle in improving the local seeing.

The DOT has modest size. We investigate upscaling of the open principle to a solar telescope with a 1.4 m primary mirror (DOT++) and to a large solar telescope with a 4 m class primary mirror (LOT). Starting from the D OT construction, we show which difficulties are encountered and which practical design solutions are found for the large sizes. We will come to a total concept during our discussion of the various parts.

The discussed parts are:

- An open telescope construction: the primary beam and mirror exposed to the wind; stiff construction, no shaking in the wind.

- Simple optics: an axial parabolic primary mirror; water-cooled field-stop in the primary focus; a limited number of components in the secondary optics, where both imaging in a multi-wavelength system and a spectrograph are still possible.

- For the LOT a high open tower with sufficient stability. The DOT/DOT++ tower (15 m high) uses the principle of pure translation of the platform under wind load. With special geometries this principle is maintained in high towers (of the order of 50 m and even more) which consist of a number of stories and can be built in normal framework technique.

Publication status:

Procs. "Innovative Telescopes and Instrumentation for Solar Astrophysics" Eds. S.L. Keil and S.V. Avakyan SPIE 4853, 294

Contact and/or more info:

R.H.Hammerschlag@astro.uu.nl
http://dot.astro.uu.nl

On the nature of tidal streams and the formation of the Milky Way

Ⓣ T,13.30

Amina Helmi[1]

1 Sterrekunding Instituut Utrecht

In currently favoured cosmological models, large galaxies like the Milky Way form as a result of mergers and accretion of smaller subunits. These mergers are expected to have left imprints in the different Galactic components, such as substructure in the motions of stars. Here, I will focus on the nature of the recently discovered ring in the outer Galactic disk, as an example of a fossil signature tracing the history of our Galaxy.

Publication status:

ApJL, in press

Contact and/or more info:

a.helmi@phys.uu.nl

http://www.astro.uu.nl/∼helmi

A colorful detector

Ⓟ 9

R.A. Hijmering[1,2]

1 Science Payloads and Advanced Concepts Office, ESTEC, Noordwijk
2 Department of Astrophysics, Nijmegen

With the SCAM project the European Space Agency working on the development of a new generation astronomical detectors for use in the optical. These new generation detectors consist out of multiple Superconducting Tunneling Junctions (STJs) that are sensitive for energies from near infrared to X-ray. The sophisticated instrument combines time, spectral and image capabilities. Making it possible to perform low-resolution spectroscopy and produce light curves with micro second resolution with a single observation. The European Space Agency has already used a 6×6 array of Tantalum junctions for astronomical observations of optical sources on the William Hershel 4.2 m telescope at La Palma. Following the success of that program a new improved instrument has been developed and is ready to see first light.

Contact and/or more info:

rhijmeri@rssd.esa.int

Probing HI in the Nearby Universe with the Upgraded WSRT

Ⓣ T,11.20

J.M. van der Hulst[1]

1 Kapteyn Instituut, Groningen

Since long it has been known that spiral galaxies show asymmetries in their HI distribution and kinematics. The early results mostly pertain to asymmetries in the HI distribution and lead to searches for lopsided galaxies based on asymmetries in the global HI profiles. Since then also galaxies have been found with asymmetries in the kinematics, i.e. asymmetric rotation curves.

The origin of this kinematic lopsidedness still is an unsolved problem. We will present the first results of a study of the ten kinematically most lopsided galaxies found in the nearby universe. We examine the properties of the galaxies and their environment to find out whether the cause for the lopsidedness is intrinsic or external.

DOT multi-channel system

Ⓟ 10

Aswin P.L. Jaegers[1], Felix C.M. Bettonvil[2,3], Rob H. Hammerschlag[3], Pit Suetterlin[3], Rob Rutten[3]

1 Instrumental Group Physics (IGF), Faculty of Physics and Astronomy, University Utrecht
2 ASTRON, Dwingeloo
3 Astronomical Institute, Utrecht

The Dutch Open Telescope (DOT) is recently upgraded to 4 CCD-cameras. The 4 cameras are part of the multi-channel system (6 CCD cameras taking high resolution images simultaneously in different wavelengths), mounted on the exis ting top structure

of the telescope. It is also possible to use this system for the DOT with a larger mirror (1.4m, the DOT++) without major design changes. To split the light in different wavelengths, series of lenses, dichroic mirrors, prismas and filters are used. The wavelengths currently in use are: 430,5nm, 432nm, 396,8nm and 655nm. The last two wavelengths are fast tunable by tilting the filters with s

mall servomotors controllable from the observing room. Two other wavelengths (656,3 and 455,4nm) with tunable Lyot-filters are in development at the moment. With the 4 channels we already succesfully observed umbral flashes and quiet granulation during the period April 23 to May 7, 2003. Also during the Mercury transit of May 7 we observed in 4 channels simultaneously.

Publication status:

Progs, F.C.M. Bettonvil, R.H. Hammerschlag, P. Suetterlin, A. P. L. Jaegers, R.J.Rutten, 2003 *Multi-wavelength imaging system for the Dutch Open Telescope* Procs. 'Innovative Telescopes and Instrumentation for Solar Astrophysics' Eds. S.L. Keil and S.V. Avakyan SPIE 4853, 306

R.H. Hammerschlag, A. P. L. Jaegers, F.C.M. Bettonvil, 2003 *Large open telescope: size-upscaling from* DOT *to* LOT Procs. 'Innovative Telescopes

and Instrumentation for Solar Astrophysics' Eds. S.L. Keil and S.V. Avakyan SPIE 4853, 294

Contact and/or more info:

A.P.L.Jaegers@phys.uu.nl
http://dot.astro.uu.nl

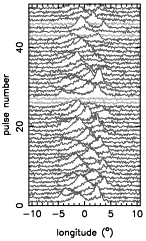
Drifting-nulling interaction in radio pulsars

Ⓟ 11

Gemma Janssen[1], Joeri van Leeuwen[1]

1 Astronomical Institute, Utrecht

Although the average pulse profile of a pulsar is very stable, its individual pulses can show much variation. Usually these single pulses consist of multiple narrow peaks ('subpulses') at changing random positions.



In some pulsars, however, the positions of these subpulses change in a regular fashion from pulse to pulse. This fascinating 'subpulse drifting' (see figure) features prominently in all discussions about the nature of the pulsar emission mechanism. Compared to the extreme conditions and short timescale in the neutron star neighbourhood, the slow movement of the drifting subpulses is unexplained.

Occasionally, pulsars suddenly cease to emit for several seconds, during a so-called 'null'. We are investigating the behaviour of the subpulse pattern around such nulls in radio pulsars B0818-13 and B0809+74 to look for clues on the nature of the pulsar emission mechanism.

Publication status:

A&A 387, 169 (2002); A&A 399, 223 (2003); A&A in preparation

Contact and/or more info:

janssen@phys.uu.nl

jleeuwen@astro.uu.nl

Probing MACHOs in M31

Ⓣ F,10.10

J.T.A. de Jong[1], K.H. Kuijken[2,1], A.P.S. Crotts[3], P.D. Sackett[4], W.J. Sutherland[5]

1 Kapteyn Institute, Groningen
2 Sterrewacht Leiden, Leiden
3 Columbia University, New York
4 Mount Stromlo Observatory, Canberra
5 Royal Observatory, Edinburgh

One of the astrophysical solutions to the galactic dark matter problem would be the presence of a significant amount of undetected compact objects in the halos of galaxies. These MAssive Compact Halo Objects (MACHOs) can be detected using gravitational microlensing. We have performed a four year survey in the Andromeda galaxy (M31) in order to determine the presence of such a microlensing halo around M31. Because of the high inclination of M31, the microlensing optical depth due to halo objects will vary strongly between the far and near side of the disk. Thus, with enough data the presence of a significant amount of MACHOs can be established unambiguously.

Publication status:

in preparation

Contact and/or more info:

jdejong@astro.rug.nl

The ANTARES neutrino telescope

Ⓣ W, 13.00

M. de Jong[1]

1 NIKHEF, Amsterdam

The Antares project envisages to build an underwater neutrino telescope. The neutrino detection is based on the detection of Čerenkov light associated with muons originating from charged current neutrino interactions in or near the active volume of the detector.

Recently, the Antares collaboration completed the phase of prototyping with the deployment of the first detector line at the foreseen site in the Mediterranean sea (at a depth of 2500 m and 40 km off the coast near Toulon). The first line consists of a so-called sector, comprising 15 photomultiplier tubes, arranged as triplets covering 5 floors with a spacing of 12 m. The final detector will consists of 12 lines each supporting five such sectors.

Contact and/or more info:

Maarten.de.Jong@nikhef.nl

HI 21cm studies of damped Lyman-α systems

Ⓣ W,15.40

Nissim Kanekar[1], Jayaram N Chengalur[2]

1 Kapteyn Astronomical Institute, University of Groningen, The Netherlands
2 National Centre for Radio Astrophysics, India

We present deep GMRT 21cm absorption spectra of 10 damped Lyman-α systems (DLAs), of which 8 are at redshifts $z \geq 1.3$. HI absorption was detected in only one DLA, the $z = 0.5318$ absorber toward PKS 1629+12. This absorber has been identified with a luminous spiral galaxy; the spin temperature limit ($T_s \leq 310$ K) derived from our observations continues the trend of DLAs associated with bright spirals having low spin temperatures. In seven of the remaining 9 systems, the observations place strong lower limits on the spin temperature of the HI gas.

We combine this sample with data taken from the literature to study the properties of all known DLAs with 21cm absorption studies. The sample of DLAs which have been searched for 21cm absorption now consists of 31 systems, with T_s estimates available in 24 cases; of these, 16 are at $z < 2$ and 8 at $z > 2$, with 11 (all at $z < 1$) having optical identifications. For the latter 11 DLAs, we find that all of the low T_s DLAs have been identified with large, luminous galaxies, while all the DLAs with high spin temperature ($T_s \geq 1000$ K) have been identified either with LSBs or dwarfs. Further, we find no correlation between impact parameter and spin temperature; it is thus unlikely that the high measured T_s values for DLAs arise from lines of sight passing through the outskirts of large disk galaxies. Instead, the spin temperature of DLAs appears to correlate with the host galaxy type.

The trend (noted earlier by Chengalur & Kanekar 2000) that low z DLAs exhibit both high and low T_s values while high redshift ($z \geq 3$) DLAs only show high spin temperatures is present in this expanded data set. Based on this difference in spin temperatures, the Gehan test rules out the hypothesis that DLAs at $z > 2$ and DLAs at $z < 2$ are drawn from the same parent population at $\sim 99\%$ confidence level.

Finally, we use the new GMRT spectra along with 2 spectra from the literature to estimate upper limits on the fraction of cold HI, $f_{\rm CNM}$, in DLAs at $z \geq 3$. For local spirals, $f_{\rm CNM} \sim 0.5$; in contrast, we find that $f_{\rm CNM} < 0.3$ in all 7 high z absorbers, and $f_{\rm CNM} < 0.1$ in 5 of the 7 cases.

Publication status:

Accepted for publication in Astronomy & Astrophysics

Contact and/or more info:

nissim@astro.rug.nl

High Frequency Features in the 1998 outburst of the microquasar 4U 1630-47

Ⓣ T,12.00

M. Klein-Wolt[1], J. Homan[2], M. van der Klis[1]

1 Astronomical Institute Anton Pannekoek, Univiveristy of Amsterdam
2 Osservatorio Astronomico di Brera

We report on the detection with RXTE of variable high frequency features in the power spectra of the black hole candidate (and micro quasar) 4U 1630–47 during its 1998 outburst. For the accurate measurement of these features we developed a new way for estimating the poisson level, based on the method by Zhang (1995). Using this method we find high frequeny features during the rise and the early decay of the outburst in the range of 100 to 600 Hz. The features are either very broad or sharp, and have rms amplitudes between ∼2–8%; their frequencies are correlated with count rate and anti-correlated with spectral hardness. Although some of these features are less coherent and stronger than found in other black hole sources, we show that they behave very similar to the high frequency feautures found in XTE J1550–564 in that their frequencies are correlated with those of the low frequency QPOs (1–10 Hz) that are simultaneously present. Together with the low frequency QPOs around 0.1 Hz (dipping behaviour), that modulate the variability at higher frequencies, the observed low and high frequency QPOs results in some of the most complex power spectra observed in black hole X-ray binaries.

Publication status:

To be submitted to ApJ

Contact and/or more info:

klein@astro.uva.nl

The Primordial Binary Population in OB Associations

Ⓣ T,10.10

Thijs Kouwenhoven[1], Anthony Brown[2], Alessia Gualandris[1,3], Lex Kaper[1], Simon Portegies Zwart[1,3], and Hans Zinnecker[4]

1 Astronomical Institute "Anton Pannekoek", Amsterdam
2 Leiden Observatory, Leiden
3 Institute for Computer Science, Amsterdam
4 Astrophysikalisches Institut Potsdam, Germany

Recent observations have shown that a large fraction of the stars are formed in binary or multiple systems. A good understanding of the primordial binary population is therefore necessary for understanding the star formation process.

We define the primordial binary population as the population of binaries which is present just after star formation has ceased, but before dynamical and stellar evolution have significantly altered its characteristics.

A combination of recent adaptive optics observations and literature data of visual, astrometric and spectroscopic binaries will be used to reconstruct the primordial binary population of the nearby OB association Sco OB2. Detailed numerical simulations will be used to study the dynamical and stellar evolution of the binary population and to characterize the observational biases. At this meeting we present the first results from adaptive optics observations of 200 members of Sco OB2.

Publication status:

In preparation; see also astro-ph/0304209

Contact and/or more info:

kouwenho@astro.uva.nl

Ionization structure in the winds of B[e] supergiants

Ⓟ 12

M. Kraus[1], H.G.L.J.M. Lamers[1]

1 Sterrenkundig Instituut, Utrecht University

The non-spherically symmetric winds of B[e] supergiants are investigated. An empirical density distribution is chosen that accounts for the density concentrations and ratios derived from observations, and our model winds are assumed to contain only hydrogen and helium.

We first calculate the approximate ionization radii for H and He and compare the results with the ionization fractions calculated from the more accurate ionization balance equations. We find that winds with a r^{-2} density distribution turn out to reach a constant ionization fraction as long as the wind density is low, i.e. in polar direction. For the high density equatorial regions, however, we find that the winds become neutral just above the stellar surface of the hot and massive B[e] supergiants forming a disk-like neutral region. In such a disk molecules and dust can form even very near the hot central star.

Publication status:

Astronomy & Astrophysics, in press

Contact and/or more info:

M.Kraus@phys.uu.nl

The parallax of 4 OH maser bearing Mira variables

Ⓣ F,11.20

Huib Jan van Langevelde[1], Wouter Vlemmings[2], Phil Diamond[3]

1 JIVE Dwingeloo
2 Cornell University
3 Jodrell Bank Observatory

The bright, compact masers in circumstellar shells can be observed with astrometric VLBI in order to accurately determine the position of the star, as well as its motion, including the parallax. Results will be presented on OH masers from 4 Mira stars monitored for 2–8 years with the VLBA. The data show that in some stars the VLBI detection is dominated by blue-shifted emission that is associated with the stellar image amplified by the maser shell in front of the star. In other cases the maser is not directly tied to the stellar position, but still persistent enough to measure proper motion and parallax. The newly derived distances allow us to compare the physical properties, such as the Period-Luminosity relation, of heavily enshrouded Mira variables with optically studied samples.

Publication status:

Astronomy & Astrophysics in preparation

Contact and/or more info:

langevelde@jive.nl

http://www.strw.leidenuniv.nl/∼vlemming/thesis/thesis.html

Radio pulsars, our small window on the total neutron star population

Ⓟ 13

Joeri van Leeuwen, Frank Verbunt, Maarten van Beek, Peter Krabbe

Astronomical Institute, Utrecht University, The Netherlands

We try to infer properties of all neutron stars by examining one specific subset, the currently detected radio pulsars, and the selection effects that determine this set.

We simulate the birth, evolution and possible detection of large numbers of neutron stars, to create a consistent picture of their population as a whole. Each simulation is governed by different assumptions regarding neutron-star magnetic fields, spin periods, beaming fractions, velocities, etcetera.

Our current understanding of neutron stars originates from both surveys and specific observations of radio pulsars (proper motion studies, deep searches in supernova remnants). We compare the outcome of each simulated set with the most recent of these observations to test the different assumptions that underly our simulations.

Using the sets that describe the observations best, we investigate the relation between pulsars and magnetars (identical or separate initial magnetic field distributions, relative birth rates). Furthermore, we compare the local pulsar birth rate with the local death rate of stars, to investigate the lower limit in mass of the neutron-star progenitors. We look into neutron-star initial velocities. Finally, we investigate the luminosity of radio pulsars and predict how many new pulsars future surveys can yield.

Publication status:

A&A 254, 198; A&A 322, 477; A&A in prep.

Contact and/or more info:

jleeuwen@astro.uu.nl,
http://www.astro.uu.nl/~jleeuwen/presentations/nac 2003/

The peculiar circumstellar environment of NGC 2024 IRS2

Ⓣ W,13.30

A. Lenorzer[1], A. Bik[1], A. de Koter[1], L.B.F.M. Waters[1,2], L. Kaper[1]

1 Astronomical Institute "Anton Pannekoek", Amsterdam
2 Instituut voor Sterrenkunde, Leuven

We re-examine the nature of IRS2, an object located in the star forming region NGC 2024 (Flame Nebula) and which has been considered to satisfy the criteria of an UCH II region. Using L-band spectroscopy of both IRS2 and IRS2b, as well as arguments based on the nature of the circumstellar material, we set a lower limit of $A_V = 31.5$ mag on the extinction towards IRS2. Taking the different aperture sizes into account, we find that the mid-infrared emission, peaking at $\sim 100\,\mu$m, does not originate in the direct surroundings of IRS2, but is coming from an extended molecular cloud. This compromises the identification of IRS2 as an UCH II region based on its mid-infrared colour. Using new K-, L- and L'-band spectroscopy and a comprehensive set of infrared and radio continuum measurements from the literature, we present diagnostic tools based on the radio slope, the strength of the infrared hydrogen recombination lines and the presence of CO band-heads to constrain the nature and spatial distribution of the circumstellar material of IRS2. Using simple gaseous and/or dust models of prescribed geometry, we find strong indications that the infrared flux originating in the circumstellar material of IRS2 is dominated by emission from a dense gaseous disk with a radius of about $130\,R_\odot$. At radio wavelengths the flux density distribution requires a second gaseous component with larger spatial extent. We do not find evidence for a significant contribution of dust to the infrared emission.

Publication status:

submitted to A&A

Contact and/or more info:

lenorzer@astro.science.uva.nl

Wide field photometry of local group dwarf galaxies

Ⓟ 14

Bruno Letarte[1], Eline Tolstoy[1], Mike Irwin[2]

1 Kapteyn Institute, Rijkuniversiteit Groningen
2 Institute of Astronomy, University of Cambridge

We present high quality wide field imaging data of the resolved stellar population in the Sculptor, Fornax and Carina dwarf galaxies. These galaxies are targets for our VLT/Flames programme, in which we will measure high-resolution spectra of hundreds of individual stars. Here we compare different population of stars within these galaxies, as selected from the Colour-Magnitude Diagrams. We look for evidence of age and/or metallicity gradients within these galaxies by determining the variation in the blue horizontal branch and the red horizontal branch stars with radius and also the blue and red side of the red giant branch. We also make comparisons with previous work.

Publication status:

in preparation

Contact and/or more info:

bruno@astro.rug.nl

Extragalactic Megamaser Mrk 273 — Result of automated data reduction

Ⓟ 15

A.F. Loenen[1], H.-R. Klöckner[1,2], W.A. Baan[2]

1 Kapteyn Astronomical Institute, Groningen
2 NFRA/ASTRON, Dwingeloo

Galaxies that harbor extragalactic Megamaser emission show enhanced core activity in the form of a nuclear starburst or an active-galactic-nucleus. The exceptional maser properties indicate that the line radiation originates in the circumnuclear environment close to the central engine and therefore exposes the nuclear properties of this type of galaxies.

Since the detection of such galaxies is still one of the main aims of hydroxyl Megamaser (OHMM) research, a set of data reduction algorithms, which can automatically calibrate and flag spectral data, was written.

The algorithms are optimized for Westerbork observations and are therefore used on a WSRT observation of the OHMM Mrk 273 as a test case.

Publication status:

Astronomy and Astrophysics, in prep.

Contact and/or more info:

loenen@astro.rug.nl

Star-formation in Abell 2670

Ⓟ 16

F.F.H. Lugt[1]

1 Kapteyn Institute, Groningen, The Netherlands.

Star-forming galaxies (SFGs) in the cluster of galaxies Abell 2670 have been searched for by looking at radio continuum emission at 20 cm. 49 SFGs have been identified and their star-formation rates (SFR) have been determined. One SFG is optically classified as an a+k galaxy. When the SFRs are plotted against galaxy surface density, it seems that there is a decrease in SFR with increasing density. There seems to be no relation between SFR and optical magnitude. Also a comparison has been made between the detection of SFGs using the equivalent width of the [OII] line and using the radio continuum. Because of scattering by dust, it seems that detecting SFGs using [OII] is less reliable than using radio emission.

Contact and/or more info:

lugt@astro.rug.nl

High brightness temperature emission from the IDV quasar J1819+3845

Ⓣ W,14.10

J.-P. Macquart[1], A.G. de Bruyn[2,1]

1 Kapteyn institute, Groningen
2 ASTRON, Dwingeloo

J1819+385 is a $z = 0.54$ quasar that exhibits intra-hour variability at centimetre wavelengths. These variations are not intrinsic, but are caused by interstellar scintillation, and we are using scintillation to probe the structure of this $\sim 50\,\mu$as quasar on micro-arcsecond scales using Earth Orbit Synthesis. This technique exploits the fact that the direction of the scintillation velocity varies on an annual cycle, allowing us to probe source structure in two-dimensions. I will also discuss the presence of diffractive scintillation in this source, which indicates the presence of very compact, exceptionally high brightness temperature emission in this source.

Publication status:

unpublished

Contact and/or more info:

jpm@astro.rug.nl

Evolution of the Circumstellar Medium around Massive Stars

Ⓟ 17

Allard-Jan van Marle[1], Norbert Langer[1]

1 Sterrekundig Instituut Universiteit Utrecht

We compute hydrodynamical models of the evolution of the circumstellar medium around a massive single star, using the results of stellar evolution calculations with mass loss through stellar winds as time-dependent inflow condition at the center of our numerical grid. The properties of the stellar wind change as the star evolves, leading to a series of wind-wind interactions. These result in moving clumpy shells around the star, which are compared to observed circumstellar nebulae. Our model starts at the Zero Age Main Sequence and is followed until the end of the star's life, thereby predicting its circumstellar environment at the time of the supernova explosion.

Publication status:

NAC 2003

Contact and/or more info:

A.vanMarle@astro.uu.nl

X-ray spectroscopy of the HMXB 4U1700-37

Ⓟ 18

A. van der Meer[1], T. Di Salvo[1], L. Kaper[1], M. Méndez[2], M. van der Klis[1]

1 Sterrenkundig Instituut "Anton Pannekoek", Amsterdam
2 SRON, National Institute for Space Research, Utrecht

We present the first results of a monitoring campaign of the high-mass X-ray binary (HMXB) system HD153919/4U1700-37, carried out with XMM-Newton in 2001. The system was observed four times, covering 37 % of one 3.41-day orbit. A selection of the EPIC/MOS-2 spectra is shown (i.e. eclipse, egress and a quiescent part), for which we report on the evolution of the observed continuum and line emission.

Publication status:

in preparation

Contact and/or more info:

ameer@science.uva.nl

Time variability in Chandra X-ray spectra of Seyfert 1 NGC 4051

Ⓟ 19

R.L.J. van der Meer[1], J.S. Kaastra[1], K.C. Steenbrugge[1]

1 SRON, National Institue for Space Research, Utrecht

We present the analysis of the Chandra LETGS spectra of NGC 4051. The Narrow-line Seyfert 1 galaxy NGC 4051 has been intensively studied and is known to contain a warm absorber. The recent Chandra LETGS spectrum shows rapid variations with changes of a factor of 10 in flux. The long term variability is shown by comparing the spectrum with the HETGS spectrum taken a year earlier. From the HETGS spectrum a velocity component of $-2340\,\mathrm{km/s}$ (blueshift) was found. The new LETGS spectrum does not show this component, but shows instead a new velocity component with almost double this speed. We draw conclusions on the dynamic constraints posed by these velocities and velocity changes.

Publication status:

analysing

Contact and/or more info:

r.l.j.van.der.meer@sron.nl

Mass-to-radius ratio of the neutron star in exo 0748–676

Ⓣ F,11.00

Mariano Méndez[1], Jean Cottam[2], Frits Paerels[3]

1 SRON
2 NASA/GSFC, USA
2 Columbia University, USA

We have analyzed all the observations of the low-mass X-ray binary EXO 0748−67 made with the XMM-Newton X-ray satellite. The combined high-resolution spectrum of the 29 burst detected in these observations shows two absorption features, at approximately 13.0 and 13.7 Å, that cannot be explained by absorption either in the circumstellar matter or in the intervening interstellar medium in the direction of this source. We show that these features are consistent with $n = 2 - 3$ transitions of Fe XXVI and Fe XXV ions, respectively, with a redshift $z = 0.350 \pm 0.005$ due to the strong gravitational field of the neutron star. This gravitational redhsift implies a mass-to-radius ratio $M/R = 0.159 \pm 0.001 M_{\odot}$/km. For an astrophysically plausible range of masses ($M \geq 1.3 M_{\odot}$), this value is consistent with models of neutron stars composed of normal nuclear matter, whereas it excludes some models in which quarks or kaon condensates are the main constituents of the neutron star. For modern equations of state for normal neutronic matter, this redshift implies that the mass and radius of the neutron star in EXO 0748−676 are constrained to $1.4 - 1.8 M_{\odot}$ and $9 - 12$ km, respectively.

Publication status:

Journal of Hopefull Astronomy, in press

Contact and/or more info:

M.Mendez@sron.nl

http://www.sron.nl/∼mariano

Disc-jet coupling in atoll-type neutron star X-ray binaries

Ⓟ 20

S. Migliari[1], R. P. Fender[1], M. Rupen[2], P. G. Jonker[3], M. Klein-Wolt[1], R. M. Hjellming[2], M. van der Klis[1]

1 Astronomical Institute "Anton Pannekoek", University of Amsterdam, and Center for High Energy Astrophysics, Amsterdam
2 National Radio Astronomy Observatory, Socorro, USA
3 Institute of Astronomy, Cambridge, UK

Atoll-type neutron star (NS) X-ray binaries share lots of properties with low/hard state black hole candidates (BHC) and are therefore the key sources for our understanding of the differences and similarities in the disc-jet connection of BHC and NS systems and the physical processes involved. We present the analysis of simultaneous radio (VLA) and X-ray (RXTE) observations of three atoll sources: 4U 1728–34, 4U 1820–30 and Ser X-1 (first radio detection). In 4U 1728–34 we find a significant correlation between radio and X-ray flux and, for the first time in an X-ray binary, a significant quantitative correlation between radio flux and X-ray timing features. As in BHCs it seems that also in atolls (i.e. in 4U 1820-30, Ser X-1 and in one observation of 4U 1728-34) the radio emission is 'quenched' above a certain luminosity, when the sources are in a softer state.

Publication status:

MNRAS, submitted

Contact and/or more info:

migliari@science.uva.nl

Optical Spectral Classification of O-stars as a function of Temperature, Metallicity and Turbulent Velocity

Ⓟ 21

Rohied Mokiem[1], Alex de Koter[1], Leticia Martín-Hernández[2], Annique Lenorzer[1], Xander Tielens[2,3]

1 Astronomical Institute Anton Pannekoek, Amsterdam
2 Kapteyn Institute, Groningen
3 SRON, National Institute for Space Reasearch, Groningen

The spectral type calibration of O-type stars is currently under debate (de Koter et al. 1998; Martins et al. 2002). Sophisticated non-LTE models show that the temperatures of main sequence stars, for a given spectral type, are up to $\sim$ 10 percent lower than previously thought. This fact has implications for e.g. the luminosity, ionizing fluxes, and derived ages of these stars.

We extend the calibration to giants and supergiants, using the quantitative criterium of the ratio of the equivalent widths of the helium lines He I λ4471 Å and He II λ4542 Å. We base our results on a grid of non-LTE line blanketed unified photosphere and wind models for O-stars of luminosity classes V, III, and Ia. These models are computed using the CMFGEN code of Hillier & Miller (1998).

Focussing on dwarf stars, we also investigate the effect of metallicity and microturbulent velocity fields on the spectral type calibration. We show that variations of these parameters may modify the equivalent width of the He I and He II lines by large enough amounts to shift the spectral type by up to half a subclass.

Publication status:

Astronomy & Astrophysics, submitted

Contact and/or more info:

mokiem@astro.uva.nl

Gaseous environment near the active nucleaus of Mrk 1 — Kinematics and composition

Ⓣ T,13.50

Amitesh Omar[1]

1 Raman Research Institute, India

We present Giant Meterwave Radio Telescope (GMRT) observations of the HI 21 cm line and Very Large Array (VLA) observations of the OH 18 cm line from the Seyfert 2 galaxy Mrk 1. Based on HI emission morphology, we speculate that the nuclear activities of Mrk 1 are triggered by tidal interactions with a nearby companion. We have detected two-component HI 21 cm line and the OH 18 cm line in absorption toward the nucleus of Mrk 1 at blueshifted velocities with respect to its systemic velocity indicating an outflow of atomic and molecular gas. The higher velocity components of the HI and OH (1667 MHz) absorption lines are blueshifted from the O[III]5007, O[I]6300, and the systemic velocity by $\sim 100\,\mathrm{km\,s^{-1}}$, but are consistent with the O[II]3727 velocity. We explain these velocity discrepancies as due to shock ionization of a region which is pushed forward due to shocks in front of the radio nucleus thereby giving a blueshift to HI, OH, and O[II] velocities. The optical depth ratios $\tau_{\mathrm{HI}}/\tau_{\mathrm{OH1667}}$ of both the components of the HI and OH absorption are ~ 3, indicating their origin in dense molecular clouds.

The Phoenix Stellar Population — HI Cloud Connection

Ⓟ 22

C.W. Ormel[1], E. Tolstoy[1]

1 Kapteyn Institute, University of Groningen

The Phoenix dwarf galaxy is a satellite of our Milky Way which has been linked with an HI cloud at the same velocity but 650 pc to the south-west of the central region. Using VLT imaging of the resolved stellar population in the centre of the ga laxy we attempt to make the connection between age and spatial distribution of the youngest stars in this galaxy and this HI cloud. The ages of the 80 brightest (and thus youngest) stars were determined using stellar isochrones. If we assume that the HI c loud was expelled from Phoenix by the star formation observed to have taken place 100 Myr ago we can estimate how fast this cloud has moved from the centre, and thus if this is the likely cause of its offset position, and we can also speculate if it will be lost to the system.

Contact and/or more info:

ormel@astro.rug.nl

http://www.astro.rug.nl/∼ormel/

The abundances of Hubble 5

Ⓟ 23

E. Platen[1], J. Bernard Salas[1,2], S.R. Pottasch[1]

1 Kapteyn Astronomical institute, Groningen
2 SRON Laboratory for Space Research, Groningen

The infrared spectrum measured by ISO-SWS of the Planetary Nebula Hubble 5 is presented. The extinction parameter, C, is determined from the infrared lines and from radio data to be 1.56. This value is lower than previous determinations. Using intensities measured by ISO together with previous published optical spectra the electron temprature and electron density have been derived. An average electron density of about 5000 cm^{-3} and a temperature of 12500 K has been found. Most values are in agreement with previous determinations, however for some individual ions there was a deviation. Abundances of many ions are obtained and in three cases a discrepancy between the optical and infrared was found. The elemental abundances for helium, nitrogen, oxygen, neon, sulfur, chlorine and argon were obtained. These values are compared with previous studies of Hubble 5 and with solar abundances

Contact and/or more info:

platen@astro.rug.nl

Generalized Main Sequence Star Models

Ⓟ 24

Arend Jan Poelarends[1], Norbert Langer[1]

1 Astronomical Institute, Utrecht

Despite the existence of well-known mass luminosity relations for main sequence stars we derived a new relation in which we replaced the mean molecular weight by the average mean molecular weight. Using a grid of over 3000 numerical stellar models, we wer e able to construct a surface in the luminosity-mass-average mean molecular weight space.

We developed a new method, based on this new derived relation between the luminosity, mass and average mean molecular weight of a star, that reconstructs, step-by-step, a stellar model which displays similar observable properties as the observed star in a binary. Within reasonable errors, we are able to calculate with this method, the actual mass of the donorstar and even the original zero-age main sequence mass.

We applied this method to the low mass black-hole binary GRO J1655-40 and were able to determine the actual mass (2.20 to 2.30 $M_{\odot}$) and ZAMS mass (2.80 to 3.5 $M_{\odot}$) of the donorstar.

Publication status:

A&A, in preparation

Contact and/or more info:

a.j.t.poelarends@astro.uu.nl

http://www.astro.uu.nl/~plarends

Morphological aberrations in the SDSS Early Data Release

Ⓟ 25

A. Popping[1], Zs. Frei[2]

1 Kapteyn Institute, PO Box 800, 9700 AV Groningen
2 Eötvös University, Budapest, Pázmány P.s. 1/A, H-1117, Hungary

The first results of the SDSS are published in the Early Data Release (EDR), which contains six percent of the final data. There are indications for morphological errors in the atlas images, but these are never investigated. A simple method is developed to compare galaxies from the Early Data Release with the galaxies in the New General Catalog. Mosaics are created which should contain exactly the same objects from both the catalogs, so big aberrations or remarkable looking objects can be noticed very fast. By looking at the field images and the original atlas images in different color bands, more information about the differences can be received. Some errors are found, especially in the case of large galaxies, but these are not very shocking. Some images are cut off, because they overlap the border of an image field. Other images contain empty areas in especially the halo, because luminous parts, caused by star clusters or other galaxies are wiped out. There are some indications for errors in luminosity, but this is not researched in detail.

Contact and/or more info:

popping@astro.rug.nl

Squashing Interstellar Clouds in 3 Dimensions

Ⓟ 26

Erik-Jan Rijkhorst[1], Garrelt Mellema[1], Jaron Kurk[2], Huub Röttgering[1]

1 Sterrewacht Leiden, Leiden, The Netherlands
2 Osservatorio Astrofisico di Arcetri, Firenze, Italy

The interstellar medium is known to be very inhomogeneous, or clumpy. This means that the structure of large scale disturbances such as shocks and ionization fronts can be modified by the presence of overdense clouds. As a shock travels through the interstellar medium, it overruns these clouds. Two dimensional hydrodynamic simulations show that, due to the high pressure in the post-shock region and rapid cooling, a cloud is first compressed and then breaks up into many small and dense fragments. These fragments are Jeans unstable and can form stars. This mechanism of jet induced star formation can thus explain the alignment of the optical/UV emission and radio axis observed in high redshift radio galaxies. In order to further investigate this problem, we have extended our simulations to three dimensions using adaptive mesh refinement.

Contact and/or more info:

rijkhorst@strw.leidenuniv.nl
http://www.strw.leidenuniv.nl/∼rijkhorst/

Polarization of gamma-ray burst afterglows

Ⓣ T,14.10

Evert Rol[1], Ralph Wijers[1], for a larger collaboration

1 Astronomical Institute "Anton Pannekoek", University of Amsterdam, Amsterdam

Gamma-ray bursts (GRBs) and their afterglows are the most luminous phenomena in the Universe, only rivalled by supernovae, their likely relatives. The explanation of the observed luminosities is found in the ultrarelativistic properties and the collimated outflow (jet) of GRBs.

Detection of polarization of GRB afterglows provides a unique way to observe the jetted outflow of the burst. Further, temporal changes in the polarization can tell us about the structure of the jet and provide insight into the sources of GRBs.

We will show the results of several several polarimetric observations of GRB afterglows of the past 3 years, and discuss them in the context of currently existing models.

Publication status:

A&A letters, submitted

Contact and/or more info:

evert@science.uva.nl

On the water abundance in the atmosphere of Jupiter

Ⓣ T,11.40

M. Roos-Serote[1], S.K. Atreya[2], M.H. Wong[3], P. Drossart[4]

1 Lisbon Astronomical Observatory, Lisbon, Portugal
2 Dept. of Atmos. Oceanic and Space Sciences, Univ. of Michigan, USA
3 NASA/Goddard Space Flight Center, USA
4 Paris-Meudon Observatory, France

Knowledge of the detailed composition of the atmospheres of the giant planets is one of the keys to the understanding of how the Solar System formed and evolved. Of the four giant planets, the composition of the atmosphere of Jupiter is by far the best known. Whereas solid results exist on the ratios of C/H, N/H, S/H, as well as for some nobel gases, the O/H ratio has been problematic to determine. In this presentation, we explain the context and address this problem. We show the results of analysis of remote sensing data from the Galileo Near Infrared Mapping Spectrometer (NIMS). We find that in the deep well mixed atmosphere of Jupiter (down to 6-8 bar), particularly in the North Equatorial Belt (NEB) region, the overall O/H ratio is compatible with two times or more solar value of this ratio. We show that further subsolar values of the O/H ratio cannot be reconciled with the data. The water vapor abundance in the NEB is also found to have a large horizontal variation, which complicates the extrapolation of the results to the whole planet.

Publication status:

Icarus, submitted

Contact and/or more info:

roos@oal.ul.pt

http://www.oal.ul.pt/∼roos

On the Search for Coherent Radiation from Radio Pulsars

Ⓟ 27

J.M. Smits[1], B.W. Stappers[2,3], J-P. Macquart[4], R. Ramachandran[2,3], J. Kuijpers[1]

1 Department of Astrophysics, University of Nijmegen, Nijmegen
2 Stichting 'Astron', Dwingeloo
3 Astronomical Institute "Anton Pannekoek", Amsterdam
4 Kapteyn Institute University of Groningen, Groningen

A recent publication shows detection of coherence in the radiation from three radio pulsars. We have done a similar analysis on two pulsars and found that the detection is likely to be due to scintillations in the interstellar medium.

Publication status:

Astronomy & Astrophysics, accepted

Contact and/or more info:

roysm@astro.kun.nl

The future of the Isaac Newton Group of Telescopes

Ⓣ T,9.30

R.G.M. Rutten[1]

1 Isaac Newton Group of Telescopes, La Palma

The telescopes at the Isaac Newton Group offer Dutch astronomers views of the Northern skies from one of the best observing sites in the world. Their future role is rapidly changing with the advent of the new generation of very large telescopes. This role is intimately linked to the requirements of the user community, and also guided by increasing international collaboration on a European scale. I will highlight ongoing developments and future instrumentation plans.

Contact and/or more info:

rgmr@ing.iac.es

http://www.ing.iac.es

The Generation of Galaxy Rotation — Galaxy Spin Alignments

Ⓟ 28

Teffie Schneider[1], Rien van de Weijgaert[2]

1 Sterrenkundig Instituut Utrecht
2 Kapteyn Instituut, Groningen

We assess the strength of galaxy spin alignments expected within the tidal torque theory for the origin of galaxy rotation. By means of a set of N-body simulations of structure formation we are studying spatial correlations between spin vector directions of collapsed clumps in the neighbourhood of large cluster-sized mass concentrations. The simulations exploit our ability to set up specific and optimal tailor-made initial conditions, in order to evaluate the strength of the spin correlations as a function of specified neighbourhood. In this poster we present background and first results of our study.

This study is based upon the theoretical framework of cosmic structure formation through gravitational instability. In this theory, collapsing overdense clumps are thought to acquire most angular momentum in the early linear phase in which the impact of the large-scale tidal environment out of which the object starts to emerge should still be an overriding one. The spatial coherence of the large-scale tidal field is expected to lead to a spatial alignment of spins of neighbouring galaxies.

Publication status:

Undergraduate thesis work

Contact and/or more info:

schneidr@astro.uu.nl
http://www.phys.uu.nl/∼schneidr

Identifying lobsidedness in spiral galaxies

Ⓟ 29

Dennis Seekles[1]

1 Kapteyn Instituut Groningen

Since long it has been known that spiral galaxies show asymmetries in their HI distribution and kinematics. The early results mostly pertain to asymmetries in the HI distribution and lead to searches for lopsided galaxies based on asymmetries in the global HI profiles. Since then also galaxies have been found with asymmetries in the kinematics, i.e. asymmetric rotation curves.

The origin of this kinematic lopsidedness still is an unsolved problem. We will present the first results of a study of the ten kinematically most lopsided galaxies found in the nearby universe. We examine the properties of the galaxies and their environment to find out whether the cause for the lopsidedness is intrinsic or external.

Contact and/or more info:

seekles@astro.rug.nl

Giant pulses from the Crab pulsar – the radio-optical connection.

Ⓟ 30

B. W. Stappers[1], A. Shearer[2], A. Golden[2], R. Strom[1]

1 Stichting ASTRON, Dwingeloo
2 National University of Ireland, Galway

The pulsar located in the Crab Nebula is one of only three pulsars known to exhibit the phenomenon of giant radio pulses. These radio pulses have durations of just a few nanoseconds and are therefore much shorter than the normal radio pulse and can be up to thousands of times brighter than the average radio emission. The Crab pulsar is also one of only a few which is seen at optical wavelengths. We present here simultaneouse observations of the Crab pulsar at both optical and radio wavelengths which show for the first time a correlation between the giant radio emission and the optical emission. The establishment of such a link allows us to determine a mechanism and location for the giant pulse emission.

Publication status:

Submitted to Science

Contact and/or more info:

stappers@astron.nl

Correlated spectral and timing behavior of the atoll sources 4U 0614+09, 4U 1728-34 and 4U 1608-52 and the millisecond pulsar SAX J1808.4-3658

Ⓟ 31

Steve van Straaten[1], Michiel van der Klis[1], Rudy Wijnands[2]

1 Astronomical Institute, "Anton Pannekoek", University of Amsterdam, and Center for High Energy Astrophysics, Amsterdam
2 School of Physics and Astronomy, University of St Andrews, St Andrews, UK

In neutron star low mass X-ray binaries matter is accreted from a gaseous star onto a neutron star through a disk. Most of the neutron star low–mass X–ray binaries can be divided into two classes, Z and atoll sources, based on the correlated behavior of their timing properties at low frequencies ($\nu <$ 200 Hz) and their X–ray spectral properties. We studied the correlated X-ray spectral and timing behaviour of the atoll sources 4U 0614+09, 4U 1608-52, and 4U 1728-34 and demonstrate that the frequencies of the variability components of these three sources follow a universal scheme of correlations relatively independent of source luminosity, suggesting a very similar accretion flow configuration. Most frequencies, in the 0.1 to 1200 Hz range, vary in a strongly correlated fashion, but one is nearly constant near 150 Hz. A similar study of the millisecond X-ray pulsar SAX J1808.4-3658 is currently in progress. This study indicates that some discrepancies occur in that source, perhaps related to a stronger or differently configured magnetic field.

Publication status:

in preparation

Contact and/or more info:

straaten@science.uva.nl

La Palma observations of umbral flashes

Ⓟ 32

L.H.M. Rouppe van der Voort[1,3], R.J. Rutten[2,3], P. Sütterlin[2], P.J. Sloover[2], J.M. Krijger[2]

1 The Institute for Solar Physics,Stockholm
2 Institute of Theoretical Astrophysics, Oslo
3 Sterrekundig Instituut Utrecht

We present high-quality Ca II H&K data showing chromospheric flashes in sunspot umbrae collected with the Swedish Vacuum Solar Telescope, the Dutch Open Telescope, and the Swedish 1-m Solar Telescope at the Roque de los Muchachos Observatory on La Palma. Differential movies, time slices, spectrograms, and Fourier power maps demonstrate that umbral flashes and running penumbral waves are closely related oscillatory phenomena, combining upward shock propagation with coherent wave spreading over the entire spot. We attribute the flash brightening to large redshift by post-shock material higher up. We find no obvious relation between umbral dots and umbral flashes.

Publication status:

Astron. Astrophys, in press

Contact and/or more info:

P.Suetterlin@astro.uu.nl

http://dot.astro.uu.nl

New developments around the Anthropic Principle

Ⓟ 33

Pim van Tend

The Anthropic Principle states that the laws of nature should be in accordance with (weak form) or lead to (strong form) the existence of man. In recent years there have been three new developments:

1. Philosopher Nick Bostrom introduced the Self Sampling Assumption, an attempted extension of the Copernican Principle to the time domain. This turns out to be of no significance to real world cosmology.

2. Theories of Everything without free parameters make the emergence of man almost inevitable, implying a strong anthropic principle. It should not be forgotten however that these theories have been deduced from a world in which man already exists.

3. Other sciences exhibit theories with a logical status similar to that of the anthropic principle in cosmology. Examples are Haeckel's Law in biology and Benford's Law in statistics.

Contact and/or more info:

pimvantend@yahoo.com
http://members.lycos.nl/vantend/dossiers/anthroe.html (English)
http://members.lycos.nl/vantend/dossiers/weblog06.html (Dutch)

Directly Measuring Galaxy Evolution from Starlight

Ⓣ F,9.00

S.C. Trager[1]

1 Kapteyn Insitute, Groningen

Absorption-line strengths give us a way to measure directly the evolution of the old stellar populations in early-type galaxies. I begin by describing the modelling required to break the age—metallicity degeneracy inherent in the optical colors and metal-line strengths in old stellar populations. Next I apply stellar population models to the line strengths of local early-type galaxies in different environments and expose the wide varieties of star-formation histories of these galaxies. I conclude the talk by demonstrating the power of absorption-line strengths by probing the evolution of early-type cluster galaxies from the local Universe out to redshifts $z = 0.41$ and even to $z \approx 0.7$.

Contact and/or more info:

sctrager@astro.rug.nl

http://www.astro.rug.nl/∼sctrager

The dynamics of the nebula M1-67 around the run-away Wolf-Rayet star WR 124

Ⓟ 34

M.V. van der Sluys[1], H.J.G.L.M. Lamers[1,2]

1 Astronomical Institute, Princetonplein 5, NL-3584 CC Utrecht, the Netherlands
2 SRON Laboratory for Space Research, Sorbonnelaan 2, NL-3584 CA Utrecht, the Netherlands

We explain the strange dynamics of the nebula M1-67 around the Wolf-Rayet star WR 124. We find that WR 124 has a relatively high spatial velocity of 175 km s^{-1} with respect to its surrounding interstellar medium (ISM). As a consequence, the stellar wind interacts with the ISM and forms a paraboloid-like bow shock. We find that the star is about 1.3 pc away from the tip of this bow shock, which is much less than the radius of a wind blown bubble around a non-moving O-star. As a consequence, matter from the outbursts that formed the nebula reaches the shock relatively quickly and interacts with it, so that the appearance and dynamics of the nebula become more chaotic. We can nevertheless show that there were at least two discrete outbursts with expansion velocities of ≈ 150 km s^{-1} and dynamical timescales of about 0.8 and 2×10^4 yr. From this, we conclude that WR 124 was probably a Luminous Blue Variable in its previous evolutionary phase.

Publication status:

A&A, 398, 181, 2003

Contact and/or more info:

sluys@astro.uu.nl, *http://www.astro.uu.nl/~sluys/M1-67/*

Backward evolutionary calculations to model double white dwarf systems

Ⓟ 35

M.V. van der Sluys[1], F.W.M. Verbunt[1], N. Langer[1], O.R. Pols[1]

1 Astronomical Institute, Princetonplein 5, NL-3584 CC Utrecht, the Netherlands

We try to explain observed double white dwarf (WD) systems using full stellar evolution codes. We assume that the systems have gone through two mass transfer phases (MTPs). Ten systems with both masses measured are known so far. They have mass ratios around 1 and orbital periods between 1.5 hours and 1.6 days, corresponding to orbital separations of 6 $R_\odot$ or less. This implies that the second MTP must have been a spiral-in in a common envelope (CE). It is reasonable to assume that the CE lasts very short compared to the evolutionary timescale, so that the core mass of the secondary star on the onset of the CE must be the mass of the second WD. We calculated orbital periods before the CE as a function of the secondary mass and currently try to find a conservative first MTP that leads to such a system. So far, stable MTPs seem to be ruled out for most systems.

Publication status:

In preparation

Contact and/or more info:

sluys@astro.uu.nl, *http://www.astro.uu.nl/~sluys/DWDs/*

Experimental Light Scattering by Astronomical Dust

Ⓟ 36

Hester Volten[1],[2], Olga Muñoz[3], John Brucato[4], Rens Waters[1], Wim van der Zande[2], Joop Hovenier[1]

1 Astronomical Institute "Anton Pannekoek", University of Amsterdam, Netherlands
2 FOM-institute AMOLF, Netherlands
3 Instituto de Astrofísica de Andalucía, Spain
4 Osservatorio Astronomico di Capodimonte, Napoli, Italy

Irregular mineral particles are important constituents in many astronomical objects, such as comets, planetary atmospheres, circumstellar envelopes and planetary nebulae. Often the light scattering properties of these particles are required for the interpretation of observations of these objects. However, because of their irregular shapes it is often impossible to calculate their light scattering properties. We report on a light scattering instrument to measure scattering matrices as functions of scattering angle of small irregular particles. With this instrument we can measure the scattering matrices of various planetary dust particles and cosmic dust analogs.

We present results of measured scattering matrix elements, for cometary dust analogs such as forsterite particles. We show that the measured degree of linear polarization proves to be very similar to observational data of comets. We have also obtained the scattering matrix elements for a large variety of mineral particles that occur in planetary atmospheres. Studying the systematic characteristics in these measured results, we discovered preferential domains in plots of scattering matrix elements as functions of the scattering angle. This may be exploited for the interpretation of observational data and the development of numerical methods to calculate light scattering by irregular dust particles.

Contact and/or more info:

volten@amolf.nl

Magnetospheric refraction — the effect of a variable emission height on radio pulsar pulse morphology

Ⓟ 37

P. Weltevrede[1], B.W. Stappers[1,2], L.J. van den Horn[1,3], R.T. Edwards[1]

1 Astronomical Institute "Anton Pannekoek", University of Amsterdam
2 Stichting ASTRON, Dwingeloo
3 Institute for Theoretical Physics, University of Amsterdam

The radiation of radio pulsars has to travel through a magnetosphere containing plasma and this plasma causes refraction of these radio waves. This means that the shape of the observed pulse profiles is affected by refraction. We argue that the emission height (the height in the atmosphere at which the plasma waves of the observing frequency are generated) is not constant for all magnetic field lines (as is usually assumed), but varies. It turns out that introducing a variable emission height in the existing refractive theory causes a focusing effect, which causes sharp edges in the simulated pulse profiles. This is never seen in observed pulse profiles, which means that existing refraction theories need refinement. We make a number of suggestions that can improve the excisting refractive theory with a view to the ultimate goal of being able to derive the magnetospheric conditions from multi-frequency observations of pulsars.

Publication status:

Submitted to A&A

Contact and/or more info:

wltvrede@astro.uva.nl

Initial tomography with the Dutch Open Telescope

Ⓟ 38

A.G. de Wijn[1], **P. Sütterlin**[1], **R.J. Rutten**[1]

1 Sterrekundig Instituut Utrecht

The Dutch Open Telescope (DOT) is an innovative solar telescope on La Palma which is presently being equipped with a six-camera multi-wavelength imaging system. It turns the DOT into a tomographic mapper, sampling the solar atmosphere from the deep photosphere to the high chromosphere with superb angular resolution (0.2″ over the full 60″×90″ field through speckle reconstruction).

The first DOT tomographic data sequences were obtained in December 2002. They combine synchronous imaging in the Fraunhofer G-band (λ = 430.5 nm) and in the extended wing of the Ca II H resonance line (λ = 396.8 nm). The G-band shows the deep solar photosphere, emphasizing tiny magnetic fluxtubes in intergranular lanes which gain brightness contrast through dissociation of the CH molecules whose lines make up the band. The Ca II H wing samples the middle photosphere (height about 300 km) with excellent response to local temperature structure because its source functuon obeys LTE while its opacity is not sensitive to temperature variations. These initial DOT Ca II H movies have unprecedented angular resolution.

A quiet-Sun Ca II movie shows considerable brightening of the magnetic network, implying that fluxtubes are heated nonradiatively already at this height. In the less magnetic internetwork areas, we observe an intriguing fast-evolving spidery pattern consisting of narrow emission ridges. It is likely to be a mixture of convective overshoot, atmospheric gravity waves, acoustic waves on their way to steepen into shocks higher up, and possibly mixed-polarity internetwork magnetism. The question is how and to which extent each constituent contributes.

We analyse the pattern and its spatiotemporal relationships to the underlying surface granulation with Fourier methods and partial time-delay

correlation techniques. We find that the spidery emission pattern has fairly high (nearly 50%) anticorrelation with dark intergranular lanes, peaking at two minutes time delay between the two layers. Ultraviolet observations from space indicate that the anticorrelation diminishes with height but grows in spatial wavelengths, which we attribute to an increasing contribution from slanted gravity waves. Lower down, convective overshoot and intergranular magnetism may be more important.

The observed pattern and its significant anticorrelation to granulation pose straightforward challenges to numerical simulation of convection with and without turbulent magnetism and including atmospheric wave generation.

Contact and/or more info:

A.G.deWijn@astro.uu.nl

http://dot.astro.uu.nl/

Observational results from thea, a step towards SKA

Ⓟ 39

Stefan J. Wijnholds[1], A. Ger de Bruyn[1], Jaap D. Bregman[1], Jan-Geralt bij de Vaate[1]

1 Stichting Astronomisch Onderzoek Nederland, Dwingeloo

The thousand element array (THEA) system is a phased array system developed as a precursor of SKA. The current system consists of four active one square metre tiles having 64 Vivaldi elements each arranged on a regular 8-by-8 grid. We present results from a number of evaluation and demonstration measurements with THEA, showing that the phased array concepts developed at ASTRON can be used successfully for astronomical observing. The system is now available to students for training and further development of observation procedures such as all sky aperture synthesis of galactic hydrogen.

Publication status:

Master's thesis

Contact and/or more info:

wijnholds@astron.nl

http://www.astron.nl

Soft X-ray Transient Outbursts: A Hard X-ray View

Ⓟ 40

W. Yu[1], M. van der Klis[1], R. Fender[1]

1 Sterrenkundig Instituut "Anton Pannekoek", UvA

Many outbursts of soft X-ray transients (SXTs) show a fast rise and exponential decay (FRED) profile in the soft X-ray band (below $\sim$ 10 keV). Here we show a view of these outbursts in the hard X-ray band (15–250 keV) obtained with the High Energy X-ray Timing Experiment on board the *Rossi* X-ray Timing Explorer (RXTE). The outbursts of black hole SXTs XTE J1550-564, 4U 1630-47 and XTE J1859+226 and neutron star SXT Aquila X-1 are presented. We have found that 1) the hard X-ray precedes the soft X-ray and peaked a few days to more than a week before the soft X-ray maximum 2) the outburst profiles show an energy dependent asymmetry 3) the hard X-ray profile clearly shows the hysteresis effect in the state transitions during the outburst rise and decay, suggesting its origin is related to the overall evolution of the corona where soft X-ray photons are upscattered to hard X-ray photons. We will also show the evidences for the early set-up of the outbursts.

Publication status:

The Astrophysical Journal, in preparation

Contact and/or more info:

yuwf@astro.uva.nl

http://zon.astro.uva.nl/~yuwf/xraytransients.html

Participants

Conny Aerts (STAFF)
conny@ster.kuleuven.ac.be
Instituut voor Sterrenkunde, Leuven

Martin van den Akker (PHD STUDENT)
martinva@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Miguel Angel Aragon Calvo (PHD STUDENT)
miguel@astro.rug.nl
Kapteyn Institute Groningen

Pablo Araya Melo (PHD STUDENT)
pablo@astro.rug.nl
Kapteyn Institute Groningen

Willem Baan (STAFF)
baan@astron.nl
ASTRON

Peter Barthel (STAFF)
pdb@astro.rug.nl
Kapteyn Instituut Groningen

Cees Bassa (PHD STUDENT)
c.g.bassa@astro.uu.nl
Sterrekundig Instituut Utrecht

Jeroen Bergmans (POST-DOC)
J.Bergmans@astro.uu.nl
Sterrekundig Instituut Utrecht

Else van den Besselaar (PHD STUDENT)
besselaar@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Hayley Bignall (POST-DOC)
bignall@jive.nl
Joint Institute for VLBI in Europe

Roy van Boekel (PHD STUDENT)
vboekel@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Christiaan Boersma (UNDERGRADUATE)
boersma@astro.rug.nl
Kapteyn Institute Groningen

Wilfried Boland (STAFF)
boland@strw.leidenuniv.nl
NOVA

Albert Bos (STAFF)
bos@astron.nl
ASTRON

Niels Bos (UNDERGRADUATE)
bos@astro.rug.nl
Kapteyn Instituut Groningen

Jaap Bregman (STAFF)
bregman@astron.nl
ASTRON

Michiel Brentjens (PHD STUDENT)
m.a.brentjens@astro.rug.nl
Kapteyn Instituut Groningen

Fran Broeckaert (GUEST)
dirk.callebaut@ua.ac.be

Anthony Brown (POST-DOC)
brown@strw.leidenuniv.nl
Sterrewacht Leiden

Hugo Buddelmeijer (UNDERGRADUATE)
nac@hugo.doemaarwat.nl
Kapteyn Instituut Groningen

Stijn Buitink (UNDERGRADUATE)
stijnbui@pulsar.astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Dirk Callebaut (STAFF)
dirk.callebaut@ua.ac.be
Dep. Natuurkunde, U. Antwerpen

Nick Cox (PHD STUDENT)
ncox@science.uva.nl
Astronomical Institute UvA

Wim De Meester (GUEST)
wim.demeester@ster.kuleuven.ac.be
Instituut voor sterrenkunde - K.U.Leuven

Nigel Douglas (STAFF)
ndouglas@astro.rug.nl
Kapteyn Institute Groningen

Pui-Kei Fung (PHD STUDENT)
fung@astro.uu.nl
Sterrekundig Instituut Utrecht

Mark Gieles (PHD STUDENT)
gieles@astro.uu.nl
Sterrekundig Instituut Utrecht

Paul Groot (STAFF)
pgroot@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Harm Habing (STAFF)
habing@strw.leidenuniv.nl
Sterrewacht Leiden

Godelieve Hammerschlag-Hensberge (STAFF)
godelievh@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Rob Hammerschlag (STAFF)
R.H.Hammerschlag@astro.uu.nl
Sterrekundig Instituut Utrecht

Peter den Hartog (PHD STUDENT)
Hartog@sron.nl
Space Research Organization Netherlands

Martin Heemskerk (STAFF)
martin@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Amina Helmi (POST-DOC)
a.helmi@phys.uu.nl
Sterrekundig Instituut Utrecht

Frank Helmich (STAFF)
f.p.helmich@sron.rug.nl
Space Research Organization Netherlands

Richard Hijmering (PHD STUDENT)
rhijmeri@rssd.esa.int
ESA/ESTEC, Afdeling Sterrekunde Nijmegen

Sake Hogeveen (STAFF)
s.j.hogeveen@astro.uu.nl
Sterrekundig Instituut Utrecht

Thijs van der Hulst (STAFF)
vdhulst@astro.rug.nl
Kapteyn Instituut Groningen

Aswin Jaegers (STAFF)
A.P.L.Jaegers@phys.uu.nl
Sterrekundig Instituut Utrecht

Gemma Janssen (UNDERGRADUATE)
g.h.janssen@phys.uu.nl
Sterrekundig Instituut Utrecht

Thom Janssen (UNDERGRADUATE)
T.Janssen@phys.uu.nl
Sterrekundig Instituut Utrecht

Jelte de Jong (PHD STUDENT)
jdejong@astro.rug.nl
Kapteyn Instituut Groningen

Peter Kamphuis (UNDERGRADUATE)
kamphuis@astro.rug.nl
Kapteyn Institute Groningen

Nissim Kanekar (POST-DOC)
nissim@astro.rug.nl
Kapteyn Institute Groningen

Geoffrey Karugila (PHD STUDENT)
geoffrey.karugila@ua.ac.be
Dep. Natuurkunde, U. Antwerpen

Ramesh Karuppusamy (STAFF)
ramesh@astron.nl
ASTRON

Marc Klein-Wolt (PHD STUDENT)
klein@astro.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Alex de Koter (STAFF)
dekoter@astro.uva.nl
Univ. van Amsterdam

Thijs Kouwenhoven (PHD STUDENT)
kouwenho@astro.uva.nl
University of Amsterdam

Katarina Kovac (PHD STUDENT)
kovac@astro.rug.nl
Kapteyn Institute Groningen

Luuk Kraak (NAC BURSAL)
pkoning@nat.vu.nl
Vrije Universiteit

Michaela Kraus (POST-DOC)
M.Kraus@phys.uu.nl
Sterrenkundig Instituut Utrecht University

Jan Kuijpers (STAFF)
kuijpers@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Sven Lafebre (UNDERGRADUATE)
svenlafe@sci.kun.nl
Afdeling Sterrenkunde Nijmegen

Huib Jan van Langevelde (STAFF)
langevelde@jive.nl
Joint Institute for VLBI in Europe

Jorrit Leenaarts (UNDERGRADUATE)
j.leenaarts@phys.uu.nl
Sterrekundig Instituut Utrecht

Joeri van Leeuwen (PHD STUDENT)
jleeuwen@astro.uu.nl
Sterrekundig Instituut Utrecht

Frans van der Lek (UNDERGRADUATE)
F.A.vanderLek@phys.uu.nl
Sterrekundig Instituut Utrecht

Annique Lenorzer (PHD STUDENT)
lenorzer@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Bruno Letarte (PHD STUDENT)
bruno@astro.rug.nl
Kapteyn Institute Groningen

Edo Loenen (UNDERGRADUATE)
loenen@astro.rug.nl
Kapteyn Instituut Groningen

Dave Lommen (UNDERGRADUATE)
Dave.Lommen@student.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Floris Lugt (UNDERGRADUATE)
lugt@astro.rug.nl
Kapteyn Instituut Groningen

Jean-Pierre Macquart (POST-DOC)
jpm@astro.rug.nl
Kapteyn Institute Groningen

Allard-Jan van Marle (PHD STUDENT)
A.vanMarle@astro.uu.nl
Sterrenkundig Instituut Utrecht

Arjen van der Meer (PHD STUDENT)
ameer@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Rob van der Meer (POST-DOC)
R.L.J.van.der.Meer@sron.nl
Space Research Organization Netherlands

Joke Meijer (PHD STUDENT)
jmeijer@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Rowin Meijerink (PHD STUDENT)
meijerin@strw.leidenuniv.nl
Sterrewacht Leiden

Garrelt Mellema (POST-DOC)
mellema@strw.leidenuniv.nl
Sterrewacht Leiden

Mariano Mendez (STAFF)
mariano@sron.nl
Space Research Organization Netherlands

Simone Migliari (PHD STUDENT)
migliari@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Rohied Mokiem (PHD STUDENT)
mokiem@astro.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Joachim Moortgat (PHD STUDENT)
moortgat@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Jacqueline Mout (UNDERGRADUATE)
J.N.Mout@phys.uu.nl
Sterrekundig Instituut Utrecht

Niels Nelson (GUEST)
nelst@wish.nl
Scholengroep Gelders Mozaiek-lok.-Thorbecke

Dieter Nickeler (GUEST)
nickeler@gmx.de
Sternwarte Neanderhoehe Hochdahl e.V.

Andreas Nigl (PHD STUDENT)
anigl@mpifr-bonn.mpg.de
Afdeling Sterrenkunde Nijmegen

Henk Olthof (GUEST)
h.olthof@wxs.nl
Kon. Ned. Ver. voor Weer- en Sterrenkunde

Amitesh Omar (PHD STUDENT)
aomar@rri.res.in
Raman Research Institute

Chris Ormel (UNDERGRADUATE)
ormel@astro.rug.nl
Kapteyn Instituut Groningen

Sijme-Jan Paardekooper (PHD STUDENT)
paardeko@strw.leidenuniv.nl
Sterrewacht Leiden

Jan-Willem Pel (STAFF)
pel@astro.rug.nl
Kapteyn Instituut Groningen

Erwin Platen (UNDERGRADUATE)
platen@astro.rug.nl
Kapteyn Instituut Groningen

Arend Jan Poelarends (PHD STUDENT)
a.j.t.poelarends@astro.uu.nl
Sterrekundig Instituut Utrecht

Onno Pols (STAFF)
o.r.pols@astro.uu.nl
Sterrekundig Instituut Utrecht

Attila Popping (UNDERGRADUATE)
popping@astro.rug.nl
Kapteyn Instituut Groningen

Simon Portegies Zwart (STAFF)
spz@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Erik-Jan Rijkhorst (PHD STUDENT)
rijkhorst@strw.leidenuniv.nl
Sterrewacht Leiden

Jelle Ritzerveld (PHD STUDENT)
ritzervj@strw.leidenuniv.nl
Sterrewacht Leiden

Gijs Roelofs (PHD STUDENT)
gijsroel@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Evert Rol (PHD STUDENT)
evert@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Maarten Roos-Serote (STAFF)
roos@oal.ul.pt
Observatorio Astronomico de Lisboa

Rene Rutten (STAFF)
rgmr@ing.iac.es
Isaac Newton Group of Telescopes

Eveline Schaekens (UNDERGRADUATE)
eschaeke@sci.kun.nl
Afdeling Sterrenkunde Nijmegen

Remco Scheepmaker (UNDERGRADUATE)
R.A.Scheepmaker@phys.uu.nl
Sterrekundig Instituut Utrecht

Teffie Schneider (UNDERGRADUATE)
schneidr@astro.uu.nl
Sterrekundig Instituut Utrecht

Roald Schnerr (PHD STUDENT)
rschnerr@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Bernard Schutz (STAFF)
moortgat@astro.kun.nl
Max-Planck-Institut fr Gravitationsphysik

Ulrich Schwarz (NAC BURSAL)
ulrichs@sci.kun.nl
Afdeling Sterrenkunde Nijmegen

Dennis Seekles (UNDERGRADUATE)
seekles@astro.rug.nl
Kapteyn Instituut Groningen

Ferry Simatupang (PHD STUDENT)
ferry@astro.rug.nl
Kapteyn Institute Groningen

Marc van der Sluys (PHD STUDENT)
sluys@astro.uu.nl
Sterrenkundig Instituut Utrecht

Roy Smits (PHD STUDENT)
roysm@astro.kun.nl
Afdeling Sterrenkunde Nijmegen

Daphne Stam (POST-DOC)
dstam@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Ben Stappers (STAFF)
stappers@astron.nl
ASTRON

Marielle Stegeman (PHD STUDENT)
stegeman@astro.uu.nl
Sterrekundig Instituut Utrecht

Steve van Straaten (PHD STUDENT)
straaten@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Pit Suetterlin (POST-DOC)
P.Suetterlin@astro.uu.nl
Sterrenkundig Instituut Utrecht

Pim van Tend (NAC BURSAL)
pimvantend@yahoo.com

Scott Trager (STAFF)
sctrager@astro.rug.nl
Kapteyn Instituut Groningen

Gregory Tucker (GUEST)
pgroot@astro.kun.nl
Brown University

Ed Van den Heuvel (STAFF)
edvdh@astro.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek'

Harro Verkouter (STAFF)
verkouter@jive.nl
Joint Institute for VLBI in Europe

Rien van de Weijgaert (STAFF)
weygaert@astro.rug.nl
Kapteyn Instituut Groningen

Patrick Weltevrede (PHD STUDENT)
wltvrede@astro.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Eduard Westra (UNDERGRADUATE)
westra@astro.rug.nl
Kapteyn Instituut Groningen

Ralph Wijers (STAFF)
rwijers@science.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA

Alfred de Wijn (PHD STUDENT)
A.G.deWijn@astro.uu.nl
Sterrekundig Instituut Utrecht

Stefan Wijnholds (STAFF)
wijnholds@astron.nl
ASTRON

Wenfei Yu (POST-DOC)
yuwf@astro.uva.nl
Sterrenkundig Instituut 'Anton Pannekoek', UvA