Dear Colleagues,

Due to restructuring of the WWW pages at the University of Illinois the URL of the U.S. homepage of the Magellanic Clouds Newsletter, formerly at http://www.astro.uiuc.edu/mcnews/MCNews.html, has changed to


Please update your bookmarks accordingly. We regret any inconvenience.

We have tried to update all links in the MCNews webpages to reflect this change. Please notify mcnews@astro.uiuc.edu if you notice links that are not working any longer. MCNews’s e-mail address and the URL of the European mirror remain unchanged. Thank you.

Eva Grebel & You-Hua Chu
Abstracts of Refereed Papers

Space Telescope Imaging Spectrograph Parallel Observations of the Planetary Nebula M94-20

Philip Plait\(^1\) and Theodore R. Gull\(^2\)

\(^1\) Advanced Computer Concepts, Inc., Potomac, MD 20854, USA
\(^2\) Laboratory for Astronomy and Solar Physics, Code 681, Goddard Space Flight Center, Greenbelt, MD 20771, USA

The planetary nebula M94–20 in the Large Magellanic Cloud was serendipitously observed with the Space Telescope Imaging Spectrograph on board the Hubble Space Telescope as part of the Hubble Space Telescope Archival Pure Parallel Program. We present spatially resolved imaging and spectral data of the nebula and compare them with ground based data, including detection of several emission lines from the nebula and the detection of the central star. We find the total H\(\alpha\) + [NII] flux = 7.3x10\(^{-15}\) erg s\(^{-1}\) cm\(^{-2}\) and we estimate the magnitude of the central star to be m\(_V\) = 26.0 ± 0.2. Many other H\(\alpha\) sources have been found in M31, M33 and NGC 205 as well. We discuss the use of the parallel observations as a versatile tool for planetary nebula surveys and for other fields of astronomical research.

For preprints, contact plait@abba.gsfc.nasa.gov
Also available from the URL http://hires.gsfc.nasa.gov/stis/science/pasp/plait/


Rosa Murphy Williams\(^1\), You-Hua Chu\(^1\), John R. Dickey\(^1\), Robert Petre\(^2\), R. Chris Smith\(^3\), and Maritza Tavarez\(^4\)

\(^1\) Astronomy Department, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA
\(^2\) NASA/GSFC code 666, Greenbelt, MD 20771, USA
\(^3\) Cerro Tololo Inter-American Observatory, La Serena, Chile
\(^4\) Astronomy Department, University of Michigan, Ann Arbor, MI 48109-1090, USA

We have used archival ROSAT data to present X-ray images of thirty-one supernova remnants (SNRs) in the Large Magellanic Cloud (LMC). We have classified these remnants according to their X-ray morphologies, into the categories of Shell-Type, Diffuse Face, Centrally Brightened, Point-Source Dominated, and Irregular. We suggest possible causes of the X-ray emission for each category, and for individual features of some of the SNRs.

Accepted by: Astrophysical Journal Supplement Series, Vol. 123 #2
For preprints, contact rosanina@astro.uiuc.edu
A Second Bright Source Detected Near SN1987A

Peter Nisenson¹ and Costas Papaliolios³

¹ Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA

Speckle interferometry observations, made just 30 and 38 days after the explosion of supernova SN1987A (SN) (which was first seen on February 23, 1987), showed evidence for a bright source, separated from the SN by only 60 mas. Reprocessing of that data using new image reconstruction algorithms has resulted in much cleaner images which not only clearly show the bright spot reported in 1987, but also a 2nd spot on the opposite side of the SN with a larger spatial separation. If the spots were ejected from the SN then the velocities of the spots are relativistic and the 2nd spot appears to be superluminal and must be blue-shifted. We explore the consequences of these results on the geometry of the SN1987A system, and we conclude that our observations may well be evidence for a relativistic jet emanating from the supernova.

Accepted by: Astrophysical Journal Letters
For preprints, contact pmisenson@cfa.harvard.edu
Also available from the URL http://xxx.lanl.gov/abs/astro-ph/9904109

A Possible Lateral Gamma-Ray Burst Jet from Supernova 1987A

R. Cen¹

¹ Princeton University Observatory, Princeton, NJ 08544, USA

There was a bright, transient companion spot to SN1987A with a projected distance of about 17 light-days, observed by speckle interferometry in the optical one to two months after explosion. It is shown here that the bright spot may be due to a receding ultra-relativistic jet traveling at ~ 45° to the observer-to-SN1987A vector, through a circumstellar medium of density profile \( \rho(r) \propto r^{-2} \). If it had approached us along the line of sight, a very bright gamma-ray burst would have been seen. The model provides an adequate explanation for the evolution of the spot and is consistent with observations of SN1987A from infrared to ultraviolet. This model implies that at least some GRBs would be seen as going through a medium with density \( \rho(r) \propto r^{-2} \).

Submitted to: The Astrophysical Journal Letters
For preprints, contact cen@astro.princeton.edu
Also available from the URL http://xxx.lanl.gov/abs/astro-ph/9904147
A BeppoSAX observation of the supersoft source 1E 0035.4-7230

P. Kahabka\textsuperscript{1}, A.N. Parmar\textsuperscript{2} and H.W. Hartmann\textsuperscript{3}

\textsuperscript{1} Astronomical Institute and Center for High Energy Astrophysics, University of Amsterdam, Kruislaan 403, 1098 SJ Amsterdam, The Netherlands
\textsuperscript{2} Astrophysics Division, Space Science Department of ESA, ESTEC, P.O. Box 299, 2200 AG Noordwijk, The Netherlands
\textsuperscript{3} SRON Laboratory for Space Research, Sorbonnelaan 2, 3584 CA Utrecht, The Netherlands

Results from a 37 ks BeppoSAX Low-Energy Concentrator Spectrometer (LECS) observation of the supersoft source SMC 13 (\textsuperscript{1}E 0035.4-7230) in the Small Magellanic Cloud are reported. This source has probably the softest spectrum observed so far with BeppoSAX, with no detected counts >0.5 keV. The BeppoSAX spectrum is fitted either with a blackbody spectrum with an effective temperature \( kT = 26\text{--}58 \) eV, an LTE white dwarf atmosphere spectrum with \( kT = 35\text{--}50 \) eV, or a non-LTE white dwarf atmosphere spectrum with \( kT = 25\text{--}32 \) eV. The bolometric luminosity is not very well constrained, it is \( < 8 \times 10^{37} \text{ erg s}^{-1} \) and \( < 3 \times 10^{37} \text{ erg s}^{-1} \) for the LTE and the non-LTE spectrum (90\% confidence).

We also applied a spectral fit to combined spectra obtained with BeppoSAX LECS and with ROSAT PSPC. We find that a blackbody spectrum with an effective temperature \( kT = 39\text{--}47 \) eV and a bolometric luminosity of \((0.3\text{--}5) \times 10^{37} \) erg s\(^{-1}\) fits the data. The data are also fitted with a blackbody with a \( kT \) of \((50\text{--}81) \) eV, an average C-edge at \((0.38\text{--}0.47) \) keV with an optical depth \( \tau > 1.1 \), and a bolometric luminosity of \((3\text{--}8) \times 10^{36} \) erg s\(^{-1}\) (90\% confidence). We also applied LTE and non-LTE white dwarf atmosphere spectra. The \( kT \) derived for the LTE spectrum is \((45\text{--}49) \) eV, the bolometric luminosity is \((3\text{--}7) \times 10^{36} \) erg s\(^{-1}\), The \( kT \) derived for the non-LTE spectrum is \((27\text{--}29) \) eV, the bolometric luminosity is \((1.1\text{--}1.2) \times 10^{37} \) erg s\(^{-1}\). We can exclude any spectrally hard component with a luminosity of more than \( 2 \times 10^{35} \) erg s\(^{-1}\) (for a bremsstrahlung with a temperature of 0.5 keV) at a distance of 60 kpc. The LTE temperature is therefore in the range \( 5.5 \pm 0.2 \times 10^{5} \) K and the non-LTE temperature in the range \( 3.25 \pm 0.16 \times 10^{5} \) K.

Assuming the source is on the stability line for atmospheric nuclear burning, we constrain the white dwarf mass from the LTE and the non-LTE fit to \( \sim 1.1 \) M\(_{\odot}\) and \( \sim 0.9 \) M\(_{\odot}\) respectively. However, the temperature and luminosity derived with the non-LTE model for \textsuperscript{1}E 0035.4-7230 is consistent with a lower mass (\( M_{\text{WD}} \sim 0.6\text{--}0.7M_{\odot} \)) white dwarf as predicted by Sion & Starrfield (1994). At the moment, neither of these two alternatives for the white dwarf mass can be excluded.

Accepted by: Astronomy and Astrophysics

For preprints, contact \texttt{ptk@astro.uva.nl}

Also available from the URL \texttt{xxx.lanl.gov/abs/astro-ph/9904012}
Discovery of Pulsed X-ray Emission from the SMC Transient RX J0117.6-7330

D.J. Macomb\(^1\), M.H. Finger\(^2\), B.A. Harmon\(^3\), R.C. Lamb\(^4\) and T.A. Prince\(^4\)

\(^1\) Lab. for High-Energy Astrophysics, NASA/GSFC, Greenbelt, MD 20771, USA
\(^2\) Astrophysics Program, University Space Research Association, USA
\(^3\) Space Sciences Laboratory, ES 84, NASA/Marshall Space Flight Center, Huntsville, AL 35812, USA
\(^4\) Space Radiation Laboratory, California Institute of Technology, Pasadena, CA 91125, USA

We report on the detection of pulsed, broad-band, X-ray emission from the transient source RX J0117.6-7330. The pulse period of 22 seconds is detected by the ROSAT/PSPC instrument in a 1992 Sep 30 – Oct 2 observation and by the CGRO/BATSE instrument during the same epoch. Hard X-ray pulsations are detectable by BATSE for approximately 100 days surrounding the ROSAT observation (1992 Aug 28 – Dec 8). The total directly measured X-ray luminosity during the ROSAT observation is 1.0E38 (d/60 kpc\(^2\)) ergs s\(^{-1}\). The pulse frequency increases rapidly during the outburst, with a peak spin-up rate of 1.2E-10 Hz s\(^{-1}\) and a total frequency change 1.8%. The pulsed percentage is 11.3% from 0.1–2.5 keV, increasing to at least 78% in the 20–70 keV band. These results establish RX J0117.6-7330 as a transient Be binary system.

Accepted by: The Astrophysical Journal Letters
For preprints, contact macomb@cowt.gsfc.nasa.gov
Also available from the URL http://xxx.lanl.gov/abs/astro-ph/9904337

ISO observations of obscured Asymptotic Giant Branch stars in the Large Magellanic Cloud

Norman R. Trams\(^1\), Jacco Th. van Loon\(^2\), L.B.F.M. Waters\(^2\), Albert A. Zijlstra\(^4\), Cecile Loup\(^5\), Patricia A. Whitelock\(^6\), M.A.T. Groenewegen\(^7\), Joris A.D.L. Blommaert\(^8\), Ralf Siebenmorgen\(^8\), A. Heske\(^8\), and Michael W. Feast\(^9\)

\(^1\) Integral Science Operations Centre, Astrophysics Div., Science Dep., ESTEC, P.O.Box 299, NL-2200 AG Noordwijk, The Netherlands
\(^2\) Astronomical Institute, University of Amsterdam, Kruislaan 403, NL-1098 SJ Amsterdam, The Netherlands
\(^3\) Space Research Organization Netherlands, Landleven 12, NL-9700 AV Groningen, The Netherlands
\(^4\) University of Manchester Institute of Science and Technology, P.O.Box 88, Manchester M60 1QD, United Kingdom
\(^5\) Institut d’Astrophysique de Paris, 98bis Boulevard Arago, F-75014 Paris, France
\(^6\) South African Astronomical Observatory, P.O.Box 9, 7935 Observatory, South Africa
\(^7\) Max-Planck Institut füır Astrophysik, Karl-Schwarzschild Straße 1, D-85740 Garching, Germany
\(^8\) ISO Data Centre, Astrophysics Division, Science Department of ESA, Villafranca del Castillo, P.O.Box 50727, E-28080 Madrid, Spain
\(^9\) Astronomy Department, University of Cape Town, 7700 Rondebosch, South Africa

We present ISO photometric and spectroscopic observations of a sample of 57 bright Asymptotic Giant Branch stars and red supergiants in the Large Magellanic Cloud, selected on the basis of IRAS colours indicative of high mass-loss rates. PHOT-P and PHOT-C photometry at 12, 25 and 60 \(\mu\)m and CAM photometry at 12 \(\mu\)m are used in combination with quasi-simultaneous ground-based near-IR photometry to construct colour-colour diagrams for all stars in our sample. PHOT-S and CAM-CVF
spectra in the 3 to 14 $\mu$m region are presented for 23 stars. From the colour-colour diagrams and the spectra, we establish the chemical types of the dust around 49 stars in this sample. Many stars have carbon-rich dust. The most luminous carbon star in the Magellanic Clouds has also a (minor) oxygen-rich component. OH/IR stars have silicate absorption with emission wings. The unique dataset presented here allows a detailed study of a representative sample of thermal-pulsing AGB stars with well-determined luminosities.

Accepted by: Astronomy and Astrophysics Main Journal
For preprints, contact ntrans@astro.estec.esa.nl
Also available from the URL http://xxx.lanl.gov/abs/astro-ph/9904353

A comparative study of the spatial distributions of Cepheids and star clusters in the Large Magellanic Cloud

P. Battinelli$^1$ and Yu.N. Efremov$^2$

$^1$ Osservatorio Astronomico di Roma, Italy
$^2$ Sternberg Astronomical Institute, Russia

A new simple method for the comparison of two-dimensional distributions is elaborated and applied to the observed spatial distributions of Cepheids and open clusters in the LMC. This method is particularly suited to pick out the clusterings within non-uniform fields. The comparative study of the spatial distributions for objects with known ages provides useful hints on the dominant mode of large scale star formation. We found that only one clump, out of four evident groups of open clusters coeval with the observed Cepheids (i.e., log $t \sim 7.5 \pm 8.5$) coincides with a local density enhancement of Cepheids. A relation between the age range inside a clump and its size is found; this is consistent with the theory of star formation in a turbulent medium.

Accepted by: Astronomy and Astrophysics
For preprints, contact battinell1@archp1.rm.astro.it

Kinematics of LMC stellar populations and self-lensing optical depth

P. Salati$^{1,2}$, R. Taillet$^{1,2}$, É. Aubourg$^3$, N. Palanque-Delabrouille$^3$ and M. Spiro$^3$

$^1$ LAPTH, chemin de Bellevue, BP 110, 74941 Annecy-le-Vieux Cedex, France
$^2$ Université de Savoie, B.P. 1104, 73011 Chambéry Cedex, France
$^3$ CEA, DSM, DAPNIA, Centre d’Études de Saclay, 91191 Gif-sur-Yvette Cedex, France

Recent observations give some clues that the lenses which the micro-lensing experiments have discovered in the direction of the Magellanic Clouds may be located in these satellite galaxies. We re-examine the possibility that self-lensing alone may account for the optical depth measured towards the Large Magellanic Cloud (LMC). We present a stellar multi-component model which is consistent with the micro-lensing observations as well as with various dynamical constraints such as the LMC rotation curve, mass and surface brightness. In this work, the emphasis is placed on the possibility
that the vertical stellar dispersion velocities, in the LMC disk, may be as large as 60 km/s. We reconcile such a large value with the limit of 20 – 30 km/s set by observation on specific LMC populations such as carbon stars. Stellar species of the LMC disk and their formation history are under scrutiny, in the light of both an analytic approach and a Monte Carlo simulation. Our model reproduces the total observed optical depth towards the LMC as well as the observed event duration distribution, while complying with the velocity dispersion measurements.

Submitted to: Astronomy & Astrophysics Letters

Abstracts of Non-Refereed Papers

30 Doradus: The low-mass stars

H. Zinnecker\textsuperscript{1}, B. Brandl\textsuperscript{2}, W. Brandner\textsuperscript{3}, A. Moneti\textsuperscript{4}, D. Hunter\textsuperscript{5}

\textsuperscript{1} Astrophysikalisches Institut Potsdam, Germany
\textsuperscript{2} Institute Cornell University, Ithaca, NY, USA
\textsuperscript{3} Caltech – JPL/IPAC, Pasadena, CA, USA
\textsuperscript{4} ISO Science Operations Centre, Vilspa, Spain
\textsuperscript{5} Lowell Observatory, AZ, USA

We present a first analysis of our deep NICMOS/HST F160W images of the 30 Doradus cluster, aimed at detecting the low-mass stellar population (M \leq 2 M_\odot). We find that the infrared luminosity function keeps rising towards the faint end and that there is no indication of a low-mass IMF cut-off down to at least 1.5 M_\odot. We also find a change of slope (steepening) in the luminosity function as a function of radial distance from the cluster center. The faintest stars we have detected have H=22.5 mag, corresponding to about M = 0.4 M_\odot at an age of 2 Myr.

For preprints, contact hzinnecker@aip.de
BeppoSAX observations of the black hole candidates
LMC X-1 and LMC X-3

A. Treves¹, M.R. Galli¹, F. Haardt¹, T. Belloni², L. Chiappetti³,
D. Dal Fiume⁴, F. Frontera⁴,⁵, E. Kuulkers⁶, L. Stella⁷

¹ Università dell’Insubria, Como, USA
² Astronomical Institute, Amsterdam, The Netherlands
³ IFCTR, Milano, Italy
⁴ IESR, Bologna, Italy
⁵ Università di Ferrara, Ferrara, Italy
⁶ SRON, Utrecht, The Netherlands
⁷ Osservatorio di Roma, Roma, Italy

We describe BeppoSAX observations of the black hole candidates LMC X-1 and LMC X-3 performed in Oct. 1997. Both sources can be modelled by a multicolor accretion disk spectrum, with temperature \( \sim 1 \) keV. However, there is some evidence that a thin emitting component coexists with the thick disk at these temperatures. In the direction of LMC X-1, we detected a significant emission above 10 keV, which we suspect originates from the nearby source PSR 0540-69. For LMC X-1, we estimate an absorbing column density of \( \sim 6 \times 10^{21} \) cm\(^{-2}\), which is almost ten times larger than that found for LMC X-3. In both sources, we find no indication of emission or absorption features whatsoever.


For preprints, contact haardt@uni.mi.astro.it

Also available from the URL http://xxx.lanl.gov/abs/astro-ph/9904018
Meeting Announcement

The Interplay Between Massive Stars and the ISM
Parallel Session I of JENAM99
(Joint European and National Astronomical Meeting)

JENAM99: September 7–11, 1999, Toulouse, France

Scope of the session:
The interplay between massive stars and the ISM plays a fundamental role in the formation and evolution of galaxies. In addition to providing ionizing photons and newly synthesized elements, massive stars inject copious amounts of kinetic energy and momentum to their surrounding gas through stellar winds and supernovae. Considerable progress has been made in the recent years on our understanding of the nature and physics of these feedback mechanisms and their importance. The aim of this session is to gather specialists from different fields which allow to contribute to a consistent picture of these phenomena.

Scientific program and contributions:
The scientific program includes three main topics:

- Stellar content and physics of massive star-forming regions (giant HII regions, starbursts)
- Chemical enrichment by massive stars
- The dynamical impact of star formation on the ISM from small to large scales

Some review talks will be invited. Oral contributions and posters are welcome.

REGISTRATION ETC.:

Information on registration, accommodation, etc. are found on the central JENAM99 page:
http://www.omp.obs-mip.fr/omp/astro/JENAM99/

This page also includes the scientific program of the plenary session and all parallel sessions. All registrations are handled centrally through this page.

May 31, 1999: Registration and hotel reservation deadline

Additional information regarding Session I is found on:

Scientific Organizing committee of Session I:
F. Ferrini (Italy), R. Gonzalez-Delgado (Spain, co-chair), M. Heydari-Malayeri (France), D. Lutz (Germany), A. Maeder (Switzerland), D. Schaerer (France, chair), R. Terlevich (United Kingdom)