Dear Colleagues,

The Magellanic Clouds Working Group is pleased to bring you issue 74 of the Magellanic Clouds Newsletter. In this issue, we present 4 submitted abstracts, an two announcements for upcoming meetings, and a collection of recent astro-ph listings of potential interest to Magellanic Clouds researchers. As always, this month’s issue is available from the MC News Website in a variety of formats (PDF, HTML, PostScript, and \LaTeX).

Best Regards,
Bryan Dunne
Editor, MC News
Abstracts of Refereed Papers

A New Look at the Kinematics of Neutral Hydrogen in the Small Magellanic Cloud

S. Stanimirović (1), L. Staveley-Smith and P. A. Jones (2)

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We have used the latest HI observations of the Small Magellanic Cloud (SMC), obtained with the Australia Telescope Compact Array and the Parkes telescope, to re-examine the kinematics of this dwarf, irregular galaxy. A large velocity gradient is found in the HI velocity field with a significant symmetry in iso-velocity contours, suggestive of a differential rotation. A comparison of HI data with the predictions from tidal models for the SMC evolution suggests that the central region of the SMC corresponds to the central, disk- or bar-like, component left from the rotationally supported SMC disk prior to its last two encounters with the Large Magellanic Cloud. In this scenario, the velocity gradient is expected as a left-over from the original, pre-encounter, angular momentum. We have derived the HI rotation curve and the mass model for the SMC. This rotation curve rapidly rises to about 60 km sec$^{-1}$ up to the turnover radius of $\sim 3$ kpc. A stellar mass-to-light ratio of about unity is required to match the observed rotation curve, suggesting that a dark matter halo is not needed to explain the dynamics of the SMC. A set of derived kinematic parameters agrees well with the assumptions used in tidal theoretical models that led to a good reproduction of observational properties of the Magellanic System. The dynamical mass of the SMC, derived from the rotation curve, is $2.4 \times 10^9 M_\odot$.


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Energy Crisis in the Superbubble DEM L 192 (N 51D)

R. L. Cooper (1,2), M. A. Guerrero (1,3), Y.-H. Chu (1), C.-H. R. Chen (1), B. C. Dunne (1)

(1) University of Illinois
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(3) now at Instituto de Astrofísica de Andalucía

Superbubbles surrounding OB associations provide ideal laboratories to study the stellar energy feedback problem because the stellar energy input can be estimated from the observed stellar content of the OB associations and the interstellar thermal and kinetic energies of superbubbles are well-defined and easy to observe. We have used DEM L 192, also known as N 51D, to carry out a detailed case study of the energy budget in a superbubble, and we find that the expected amount of stellar mechanical energy injected into the ISM, $(18 \pm 5) \times 10^{51}$ ergs, exceeds the amount of thermal and kinetic energies stored in the superbubble, $(6 \pm 2) \times 10^{51}$. Clearly, a significant fraction of the stellar mechanical energy must have been converted to other forms of energy. The X-ray spectrum
of the diffuse emission from DEM L 192 requires a power-law component to explain the featureless emission at 1.0–3.0 keV. The origin of this power-law component is unclear, but it may be responsible for the discrepancy between the stellar energy input and the observed interstellar energy in DEM L 192.

Comments: To appear in the Astrophysical Journal, April 20 issue
e-mail: rcooper1@astro.uiuc.edu

The hot and cool component of the symbiotic nova SMC 3. A supersoft X-ray variable and a small-amplitude red variable

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The ~6 year supersoft X-ray lightcurve of the symbiotic nova SMC 3 (= RX J0048.4–7332) in the Small Magellanic Cloud is derived from archival ROSAT PSPC and HRI data. It shows one deep X-ray eclipse during which the count rate decreased by a factor of $\gtrsim 80$. In MACHO B-band data sinusoidal variation is found with a quasi-periodicity of ~4 years. The minimum of the B-band flux occurs during the X-ray eclipse. In OGLE II I-band observations performed after the ROSAT observations we detect 110±2 day oscillations which we interpret as pulsations of the M0 giant star in the symbiotic system. The observed duration of the supersoft X-ray eclipse of ~0.4–1.8 years is explained by the occultation of the white dwarf by the giant companion with an orbital period of ~(4.0–4.8) years and a strong wind blown from its surface with a mass loss rate of ~$(2.6–8.2) \times 10^{-7}$ $M_\odot$ yr$^{-1}$, assuming that ~$1–3.5\%$ of the ionized phase is neutral (e.g. due to dust) and assuming a terminal velocity of ~30 km s$^{-1}$. The ~4 year quasi-periodicity found in the optical is explained as the binary orbital period of the system. It is less likely that it reflects the activity (or mass-loss) time scale of the red giant star. A ~(700-800) day quasi-periodicity found in the OGLE II and MACHO data is explained as the first harmonic of a binary orbital cycle. SMC 3 therefore may be classified as a small-amplitude red variable star (SARV). The hot star most likely is in a state of steady nuclear burning with an accretion rate somewhat below the upper critical value of ~$10^{-7}$ $M_\odot$ yr$^{-1}$.

Comments: Accepted by: Astronomy & Astrophysics
e-mail: pkahabka@astro.uni-bonn.de
Multiwavelength Cross-Identifications of Stars. Application to Stellar Populations in the Magellanic Clouds and to Young Stars of our Galaxy.

Dr Nausicaa Delmotte

ESO, European Southern Observatory, Garching bei Muenchen Home institution: CDS, Strasbourg, France

My thesis benefits from the recently released infrared and visible large surveys and takes place within the framework of the ongoing Virtual Observatory. I built a Master Catalogue of stars towards the Magellanic Clouds (MC2) based on multiwavelength cross-identifications of the DENIS, 2MASS, GSC-II and UCAC point source catalogues. I derived important results on the astro-photometric accuracy and calibration of the cross-identified catalogues. The MC2 can be queried on-line through a dedicated web interface I designed to handle its composite nature. See http://vizier.u-strasbg.fr/MC2/. I produced multispectral views of the LMC where its various populations discriminate remarkably well in colour-colour and colour-magnitude diagrams based on both infrared and visible wavelengths. The MC2 provides an unprecedented basis for the study of stellar populations in the Magellanic Clouds and for further cross-identifications with catalogues at other wavelengths. I calibrated the absolute magnitudes of the B-type stars in the near-infrared, as a function of their spectral types. I combined high quality Hipparcos-based distance measurements with homogeneous photometry from the near-infrared 2MASS point sources. I corrected the data from extinction effect and assessed by means of simulations the contribution of various measurement errors and physical effects (binarity, rotation) to the scatter observed in the calibration. It is a mandatory step towards the determination of the structure of the young Galactic disk and of the distances and properties of young open clusters revealed by large area infrared surveys such as 2MASS. I started a morphological and multiwavelength analysis of ionized regions and their stars in the LMC, observed in narrow-band imaging. Massive stars and their reciprocal interaction with the surrounding interstellar medium enable to gain insight into the local star formation history and stellar contents of these regions and to obtain a sketch of their dynamical evolution.

Comments: European doctorate Thesis Advisor: Daniel Egret Co-Advisor: Fernando Comern
WWW: http://www.eso.org/~ndelmott/PhD/
e-mail: ndelmott@eso.org
Meeting Announcements

Planets To Cosmology: Essential Science In Hubble’s Final Years
May 3–6, 2004
Baltimore, Maryland USA

The upcoming STScI May Symposium will take place May 3-6, 2004, with registration and a reception on May 2, 2004. The Symposium will concentrate on the most recent science accomplished by HST and other observatories and potential future advances. A broad range of topics will be covered, with sessions devoted to: Planets (both in the solar system and extrasolar); Star Formation (in the Local Group, in clusters); Black Holes (at galaxy centers, potential existence in globular clusters); the ISM and the IGM (the baryon content, feedback); Galaxy Formation and Evolution (mass assembly, morphological evolution); Cosmology (the nature of dark energy, high-z supernovae, cosmological parameters).

The program will be composed primarily of invited talks, with a small number of contributed talks. We are soliciting contributed talks. If you are interested in presenting such talk, please send a title and an abstract to the Symposium’s Coordinator, Quindairian S. Gryce by February 15, 2004. If you intend to present a poster, please indicate so on the registration form. Please take note of the requirements for the poster session.

Deadlines
  • 15 February 2004 - Contributed Talk Submission Deadline
  • 2 April 2004 - Early Registration
  • 23 April 2004 - Poster Session Packet Deadline

For more information, contact the meeting organizers at:
E-mail: Mrs. Quindairian S. Gryce, Meeting Coordinator, gryce@stsci.edu
WWW: http://sd.stsci.edu/Planets_to_Cosmology/index.html
The interstellar medium (ISM) provides the material to form stars and occupies the vast majority of space. As a result of star formation and stellar energy feedback, the physical conditions of the ISM evolve and produce multiple phases. On scales from a few pc to a few hundred pc, interstellar shells form from stellar winds and supernovae. On the global scale, an interstellar matrix of neutral and ionized, hot and cold phases exists. The formation and evolution of all interstellar structures are subject to the influence of magnetic field.

To understand diffuse matter in the Galaxy, it is necessary to study from observational and theoretical perspectives:

1. The global structure of the ISM - the production, distribution, and evolution of the multiple phase components
2. Interstellar shells - their formation and evolution, and their contribution to the global interstellar structure
3. Interstellar magnetic fields - how they influence star formation and dynamical interactions in the ISM

For four decades, Carl Heiles has played a pioneering role in all these topics. His work, primarily observational, has had an important influence upon our understanding of the diffuse ISM. His work has also helped to shape theoretical ideas of this medium. Therefore, it is most fitting to honor Carl, a distinguished researcher and an inspiring professor, with a meeting dedicated to observational and theoretical studies of the diffuse ISM.

The meeting will be held at Arecibo, Puerto Rico on Aug 29 - Sep 2, 2004. The logistics are still being arranged. This is a preliminary announcement. To help us organize the meeting program, we would like to obtain a rough head count and participants' interests. If you are interested in attending this meeting, please reply to ism@astro.uiuc.edu by February 29th. You may also indicate if you are interested in giving a talk or poster session. Further meeting announcements will be e-mailed to only those who reply. Please feel free to forward this announcement to people who might be interested.

Thank you.

**Deadlines**
- 29 February 2004 - Indicate Interest in Meeting

For more information, contact the meeting organizers at:

**E-mail:** ism@astro.uiuc.edu
Recent astro-ph Listings

astro-ph/0402145
Title: Period-color and amplitude-color relations in classical Cepheid variables
Authors: S. Kanbur (UMASS), C. Ngeow (UMASS)
Comments: 10 pages, 5 figures and 5 tables. MNRAS accepted

astro-ph/0402096
Title: BeppoSAX observations of the accretion-powered X-ray pulsar SMC X-1
Authors: S. Naik (1,2), B. Paul (2) ((1) Department of Physics, University College Cork, Cork, Ireland, (2) Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba, Mumbai, India)
Comments: 8 Pages, 6 figures, Accepted for publication in A&A

astro-ph/0402066
Title: Evidence of a mis-aligned secondary bar in the Large Magellanic Cloud
Authors: Annapurni Subramaniam

astro-ph/0402053
Title: Monitoring and Discovering X-ray Pulsars in the Small Magellanic Cloud
Authors: R.H.D. Corbet, S. Laycock, M.J. Coe, F.E. Marshall, C.B. Markwardt
Comments: 5 pages, 4 figures, AIP conference proceedings format.
Contribution to "X-ray Timing 2003: Rossi and Beyond." meeting held in Cambridge, MA, November, 2003

astro-ph/0401399
Title: Terminal velocities of luminous, early-type SMC stars
Authors: C. J. Evans, D. J. Lennon, C. Trundle, S. R. Heap, D. J. Lindler

astro-ph/0401344
Title: Interstellar Extinction in the Milky Way Galaxy
Authors: Edward L. Fitzpatrick

astro-ph/0401211
Title: The effect of metallicity on the Cepheid Period-Luminosity relation from a Baade-Wesselink analysis of Cepheids in the Galaxy and in the Small Magellanic Cloud
Authors: Jesper Storm (1), Bruce W. Carney (2), Wolfgang P. Gieren (3), Pascal Fouque (4 and 5), David W. Latham (6), Anne M. Fry (2) ((1) Astrophysikalisches Institut Potsdam, (2) Univ. of North Carolina at Chapel Hill, (3) Univ. de Concepcion, (4) Observatoire de Paris, (5) European Southern Observatory, (6) Harvard-Smithsonian Center for Astrophysics)
Comments: 23 pages, 9 figures, accepted for publication in A&A
astro-ph/0401151
Title: BVRIJK light curves and radial velocity curves for selected Magellanic Cloud Cepheids
Authors: Jesper Storm (1), Bruce W. Carney (2), Wolfgang P. Gieren (3), Pascal Fouque (4,5), Wendy L. Freedman (6), Barry F. Madore (7), Michael J. Habgood (2) ((1) Astrophysikalisches Institut Potsdam, (2) Univ. of North Carolina at Chapel Hill, (3) Universidad de Concepcion, (4) Observatoire de Paris, (5) European Southern Observatory, (6) Carnegie Institution of Washington, (7) California Institute of Technology)
Comments: Accepted for publication in A&A, 23 pages, 10 figures, data tables will be made available electronically from the CDS

astro-ph/0312620
Title: Radioactivity of the Key Isotope 44Ti in SN 1987A
Authors: Yuko Motizuki, Shiomi Kumagai
Comments: 6 pages, 2 figures; Invited talk, in Proceedings of Tours Symposium on Nuclear Physics V (Tours2003), Tours, France, August 2003, eds. H. Utsunomiya et al., AIP Conference Series, in press

astro-ph/0312509
Title: Chandra High-Resolution X-Ray Spectrum of Supernova Remnant 1E0102.2-7219
Comments: 47 pages, 14 figures, accepted for publication in ApJ

astro-ph/0312462
Title: The Stellar Halo in the Large Magellanic Cloud: Mass, Luminosity, and Microlensing Predictions
Authors: David R. Alves (Columbia)
Comments: 11 pages, 1 figure, accepted to ApJ Letters

astro-ph/0312356
Title: A Discovery of a Peculiar Pulsar in the Small Magellanic Cloud
Authors: Masaru Ueno, Hiroya Yamaguchi, Shin-ichiro Takagi, Jun Yokogawa, Katsuji Koyama (Kyoto Univ.)
Comments: 5 pages, 5 figures, Accepted for publication in PASJ

astro-ph/0312323
Title: The WSRT wide-field HI survey: II. Local Group features
Authors: Robert Braun (1), David Thilker (2) ((1) ASTRON, (2) Johns Hopkins Univ)
Comments: 16 pages, 12 figures, accepted for publication in A&A