$\mathcal{SCYON}$

The Star Clusters Young & Old Newsletter

edited by Holger Baumgardt, Ernst Paunzen and Pavel Kroupa

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`http://astro.u-strasbg.fr/scyon`

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EDITORIAL

Dear Subscribers,

Here is the 33rd issue of the SCYON newsletter. The current issue contains 21 abstracts from refereed journals, an announcement for the upcoming JENAM 2007 conference, and job advertisements for postdoctoral and PhD positions from the Astronomical Institute of the Czech Academy of Sciences and Vienna University.

Thank you to all those who sent in their contributions.

Holger Baumgardt, Ernst Paunzen and Pavel Kroupa

CONTENTS

SCYON POLICY

The SCYON Newsletter publishes abstracts from any area in astronomy which are relevant to research on star clusters. We welcome all contributions. Topics to be covered include

1. Abstracts from refereed articles
2. Abstracts from conference proceedings
3. PhD summaries
4. General announcements : Conferences, new databases, and the likes.

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SCYON will be published initially once every two months. If the number of contributions justifies monthly installments, we will move toward more frequent issues in order to keep the newsletter relatively short, manageable for us, and up-to-date.

Conference and journal abstracts can be submitted at any time either by web download, or failing this, we also accept abstracts typeset using the latest latex abstract template (available from the SCYON webpage). We much prefer contributors to use the direct download form, since it is mostly automated. Abstracts will normally appear on the website as soon as they are submitted to us. Other contributions, such as PhD summaries, should be sent to us using the LaTeX template. *Please do not submit postscript files, nor encoded abstracts as e-mail attachments.*

All abstracts/contributions will be processed, but we reserve the right to not post abstracts submitted in the wrong format or which do not compile. If you experience any sort of problems accessing the web site, or with the LaTeX template, please write to us at scyon@astro.u-strasbg.fr.

A "Call for abstracts" is sent out approximately one week before the next issue of the newsletter is finalised. This call contains the deadline for abstract submissions for that coming issue and the LaTeX abstract template.

Depending on circumstances, the editors might actively solicit contributions, usually those spotted on a preprint server, but they do not publish abstracts without the author's consent.

We implicitly encourage further dissemination of the letter to institutes and astronomers who may benefit from it.

The editors

SCYON Mirrors

The official Scyon mirror site in Australia is hosted at the Centre for Astrophysics & Supercomputing of the University of Swinburne by Duncan Forbes and his team :

HTTP://ASTRONOMY.SWIN.EDU.AU/SCYON/)

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1. Star Forming Regions

Near-Infrared Polarization Images of The Orion Molecular Cloud 1 South Region

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We present the polarization images in the J, H, & Ks bands of the Orion Molecular Cloud 1 South region. The polarization images clearly show at least six infrared reflection nebulae (IRNe) which are barely seen or invisible in the intensity images. Our polarization vector images also identify the illuminating sources of the nebulae: IRN 1 & 2, IRN 3, 4, & 5, and IRN 6 are illuminated by three IR sources, Source 144-351, Source 145-356, and Source 136-355, respectively. Moreover, our polarization images suggest the candidate driving sources of the optical Herbig-Haro objects for the first time; HH529, a pair of HH202 and HH528 or HH 203/204, HH 530 and HH269 are originated from Source 144-351, Source 145-356, and Source 136-355, respectively.

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Also available from the URL `http://pigpen3.mtk.nao.ac.jp/~proA/omc_1s.pdf`

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Near-Infrared Imaging Polarimetry of the Star Forming Region NGC 2024

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We conducted wide-field JHKs imaging polarimetry toward NGC 2024. We found a prominent and extended polarized nebula over NGC 2024, and constrained the location of illuminating source of the nebula through the analysis of polarization vectors. A massive star, IRS 2b, is located in the center of the symmetric vector pattern. Five small polarized nebulae associated with YSOs are discovered on our polarization images. These nebulae are responsible for the structures of circumstellar matter that produce strongly polarized light through dust scattering. For the point-like sources, we performed software aperture polarimetry in order to measure integrated polarizations, and found five young brown dwarfs with highly polarized integrated emission. These sources serve as direct evidence for the existence of disk/envelope system around brown dwarfs. We investigated the magnetic field structure of NGC 2024 through the measurements of dichroic polarization. The average position angle of projected magnetic fields across the region is found to be 110 degrees. We found a good consistency in magnetic field structures obtained using near-infrared dichroic polarization and sub-mm/far-infrared dust emission polarization, indicating that the dichroic polarizations at near-infrared wavelengths trace magnetic field structures inside dense molecular clouds.

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Also available from the URL `http://arxiv.org/abs/astro-ph/0702597`
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Near-Infrared Imaging Polarimetry of the NGC 2071 Star Forming Region with SIRPOL

Motohide Tamura([1,2]), Ryo Kandori([1]), Jun Hashimoto([1,3]), Nobuhiko Kusakabe([2]), Yasushi Nakajima([1]), Shuji Ssato([4]), Chie Nagashima([3]), Mikio Kurita([4]), Tetsuya Nagata([5]), Takahiro Nagayama([5]), Jim Hough([6]), Tomoaki Matsumoto([7]), Antonio Chrysostomou([6])

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We have conducted deep JHKs imaging polarimetry of a ∼8' x 8' area of the NGC 2071 star forming region. Our polarization data have revealed various infrared reflection nebulae (IRNe) associated with the central IR young star cluster NGC2071IR and identified their illuminating sources. There are at least 4 IRNe in NGC2071IR and several additional IRNe are identified around nearby young stars in the same field-of-view. Each illuminating source coincides with a known near-IR source except for IRS3, which is only a part of IRN2 and is illuminated by the radio source 1c. Aperture polarimetry of each cluster source is used to detect unresolved circumstellar disk/outflow systems. Aperture polarimetry of the other point-like sources within the field is made in this region for the first time. The magnetic field structures (from ∼1 pc down to ∼0.1 pc) are derived using both aperture polarimetry of the point-like sources and imaging polarimetry of the shocked H2 emission that is seen as the dominant knotty nebulae in the Ks band image; they are both of dichroic origin and the derived field directions are consistent with each other. The magnetic field direction projected on the sky is also consistent with that inferred from the 850 micron thermal continuum emission polarimetry of the central 0.2 pc region, but running roughly perpendicular (∼75 degrees) to the direction of the large scale outflow. We argue that the field strength is too weak to align the outflow in the large scale field direction via magnetic braking.

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Also available from the URL `http://arxiv.org/abs/astro-ph/0701552`
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2. Galactic Open Clusters

Astrophysical supplements to the ASCC-2.5. Ia. Radial velocities of ∼55000 stars and mean radial velocities of 516 Galactic open clusters and associations

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We present the 2nd version of the Catalogue of Radial Velocities with Astrometric Data (CRVAD-2). This is the result of the cross-identification of stars from the All-Sky Compiled Catalogue of 2.5 Million Stars (ASCC-2.5) with the General Catalogue of Radial Velocities and with other recently published radial velocity lists and catalogues. The CRVAD-2 includes accurate J2000 equatorial coordinates, proper motions and trigonometric parallaxes in the Hipparcos system, B, V photometry in the Johnson system, spectral types, radial velocities (RVs), multiplicity and variability flags for 54907 ASCC-2.5 stars. We have used the CRVAD-2 for a new determination of mean RVs of 363 open clusters and stellar associations considering their established members from proper motions and photometry in the ASCC-2.5. For 330 clusters and associations we compiled previously published mean RVs from the literature, critically reviewed and partly revised them. The resulting Catalogue of Radial Velocities of Open Clusters and Associations (CRVOCA) contains about 460 open clusters and about 60 stellar associations in the Solar neighbourhood. These numbers still represent less than 30% of the total number of about 1820 objects currently known in the Galaxy. The mean RVs of young clusters are generally better known than those of older ones.

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CCD BV survey of 42 open clusters

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We present results of a photometric survey whose aim was to derive structural and astrophysical parameters for 42 open clusters. While our sample is definitively not representative of the total open cluster sample in the Galaxy, it does cover a wide range of cluster parameters and is uniform enough to allow for simple statistical considerations. BV wide-field CCD photometry was obtained for open clusters for which photometric, structural, and dynamical evolution parameters were determined. The limiting and core radii were determined by analyzing radial density profiles. The ages, reddenings, and distances were obtained from the solar metallicity isochrone fitting. The mass function was used to study the dynamical state of the systems, mass segregation effect and to estimate the total mass and number of cluster members. This study reports on the first determination of basic parameters for 11 out of 42 observed open clusters. The angular sizes for the majority of the observed clusters appear to be several times larger than the catalogue data indicate. The core and limiting cluster radii are correlated and the latter parameter is 3.2 times larger on average. The limiting radius increases with the cluster's mass, and both the limiting and core radii decrease in the course of dynamical evolution. For dynamically not advanced clusters, the mass function slope is similar to the universal IMF slope. For more evolved systems, the effect of evaporation of low-mass members is clearly visible. The initial mass segregation is present in all the observed young clusters, whereas the dynamical mass segregation appears in clusters older than about log(age)=8. Low-mass stars are deficient in the cores of clusters older than log(age)=8.5 and not younger than one relaxation time.

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Broad Band Optical Polarimetric Study of IC 1805

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We present the BVR broad band polarimetric observations of 51 stars belonging to the young open cluster IC 1805. Along with the photometric data from the literature we have modeled and subtracted the foreground dust contribution from the maximum polarization (P_{max}) and colour excess (E_{B-V}). The mean value of the P_{max} for *intracluster* medium and the foreground are found to be 5.008 ± 0.005 % and 4.865 ± 0.022 % respectively. Moreover, the mean value of the wavelength of maximum polarization (λ_{max}) for *intracluster* medium is 0.541 ± 0.003 μm, which is quite similar as the general interstellar medium (ISM). The resulting *intracluster* dust component is found to have negligible polarization efficiency as compared to interstellar dust. Some of the observed stars in IC 1805 have shown the indication of intrinsic polarization in their measurements.

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Also available from the URL `http://adsabs.harvard.edu/abs/2007astro.ph..3580M`

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SPITZER: Accretion in Low Mass Stars and Brown Dwarfs in the Lambda Orionis Cluster

D. Barrado y Navascues, J.R. Stauffer, M. Morales-Calderon, A. Bayo, G. Fazzio, T. Megeath, L. Allen, L-W- Hartmann, N. Calvet,
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We present multi-wavelength optical and infrared photometry of 170 previously known low mass stars and brown dwarfs of the 5 Myr Collinder 69 cluster (Lambda Orionis). The new photometry supports cluster membership for most of them, with less than 15% of the previous candidates identified as probable non-members. The near infrared photometry allows us to identify stars with IR excesses, and we find that the Class II population is very large, around 25% for stars (in the spectral range M0 - M6.5) and 40% for brown dwarfs, down to 0.04 Msun, despite the fact that the H(alpha) equivalent width is low for a significant fraction of them. In addition, there are a number of substellar objects, classified as Class III, that have optically thin disks. The Class II members are distributed in an inhomogeneous way, lying preferentially in a filament running toward the south-east. The IR excesses for the Collinder 69 members range from pure Class II (flat or nearly flat spectra longward of 1 micron), to transition disks with no near-IR excess but excesses beginning within the IRAC wavelength range, to two stars with excess only detected at 24 micron. Collinder 69 thus appears to be at an age where it provides a natural laboratory for the study of primordial disks and their dissipation.

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Pre-main-sequence stars in the young open cluster NGC 1893. II: Evidence for triggered massive star formation

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The open cluster NGC1893, illuminating the HII region IC410, contains a moderately large population of O-type stars and is one of the youngest clusters observable in the optical range. It is suspected to harbour a large population of pre-main-sequence (PMS) stars.

We have probed the stellar population of NGC1893 in an attempt to determine its size and extent. In particular, we look for signs of sequential star formation.

We classify a large sample of cluster members with new intermediate resolution spectroscopy. We use H-alpha slitless spectroscopy of the field to search for emission line objects, identifying 18 emission-line PMS stars. We then combine existing optical photometry with 2MASS JHKs photometry to detect stars with infrared excesses, finding close to 20 more PMS candidates.

While almost all stars earlier than B2 indicate standard reddening, all later cluster members show strong deviations from a standard reddening law, which we interpret in terms of infrared excess emission. Emission-line stars and IR-excess objects show the same spatial distribution, concentrating around two localised areas, the immediate vicinity of the pennant nebulae Sim129 and Sim130 and the area close to the cluster core where the rim of the molecular cloud associated with IC410 is illuminated by the nearby O-type stars. In and around the emission nebula Sim130 we find three Herbig Be stars with spectral types in the B1-4 range and several other fainter emission-line stars. We obtain a complete census of B-type stars by combining Strmgren, Johnson and 2MASS photometry and find a deficit of intermediate mass stars compared to massive stars. We observe a relatively extended halo of massive stars surrounding the cluster without an accompanying population of intermediate-mass stars.

Stars in NGC1893 show strong indications of being extremely young. The pennant nebula Sim130 is an area of active massive star formation, displaying very good evidence for triggering by the presence of nearby massive stars. The overall picture of star formation in NGC1893 suggests a very complex process.

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The old open clusters Berkeley 32 and King 11

Monica Tosi ([1]), Angela Bragaglia ([1]), Michele Cignoni ([1,2])
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We have obtained CCD BVI imaging of the old open clusters Berkeley 32 and King 11. Using the synthetic colour-magnitude diagram method with three different sets of stellar evolution models of various metallicities, with and without overshooting, we have determined their age, distance, reddening, and indicative metallicity, as well as distance from the Galactic centre and height from the Galactic plane. The best parameters derived for Berkeley 32 are: subsolar metallicity (Z=0.008 represents the best choice, Z=0.006 or 0.01 are more marginally acceptable), age = 5.0-5.5 Gyr (models with overshooting; without overshooting the age is 4.2-4.4 Gyr with poorer agreement), $(m-M)_0$=12.4-12.6, E(B-V)=0.12-0.18 (with the lower value being more probable because it corresponds to the best metallicity), Rgc $\sim$ 10.7-11 kpc, and $|Z| \sim$ 231-254 pc. The best parameters for King 11 are: Z=0.01, age=3.5-4.75 Gyr, $(m-M)_0$=11.67-11.75, E(B-V)=1.03-1.06, Rgc $\sim$ 9.2-10 kpc, and $|Z| \sim$ 253-387 pc.

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3. Galactic Globular Clusters

FSR1735 – A new globular cluster candidate in the inner Galaxy

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We carry out a large program to classify newly discovered star clusters from Froebrich et al. (2006) in the inner Galaxy. Here, we present a first analysis of a new high-priority globular cluster candidate, FSR1735 at l=339.1879; b=-1.8534, based on new deep near infrared observations from Sofi at the NTT. A significant peak in the K-band luminosity function is found, which is interpreted as the clump of post-He-flash stars. The distance and the reddening of the cluster are determined to 9.1kpc and $A_K = 0.5$ mag, respectively, the metallicity is estimated to [M/H]=-0.8. Radial star density profiles are used to measure the core radius and the tidal radius of the cluster.

The lack of signs for on-going star formation and the position in the Galaxy pose strong arguments against the interpretation of this object as a young or old open cluster. All the observational evidence is in agreement with the interpretation that FSR1735 is a so far unknown globular cluster in the inner Galaxy.

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Multi-Color Photometry of the Galactic Globular Cluster M75 = NGC 6864. A New Sensitive Metallicity Indicator and the Position of the Horizontal Branch in UV

V. Kravtsov ([1,2]), G. Alcaino ([3]), G. Marconi ([4]) F. Alvarado ([3])

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We carry out and analyze new multi-color photometry of the Galactic globular cluster (GC) M75 in UBVI and focus on the brighter sequences of the color-magnitude diagram (CMD), with particular emphasis on their location in U-based CMD. Specifically, we study the level both of the horizontal (HB) and red giant branches (RGB) relative to the main-sequence turnoff (TO) in the U magnitude. Along with the presented photometry of M75, we use our collection of photometric data on GCs belonging to the metal-poor range, [Fe/H]zw < -1.1 dex, obtained from observations with different equipment, but calibrated by standard stars situated in the observed cluster fields. We confirm our earlier finding, and extend it to a larger magnitude range. We demonstrate that Delta U_{TO}^{BHB} expressing the difference in U magnitude between the TO point and the level of the blue HB, near its red boundary, of the metal-poor GCs observed with the EMMI camera of the NTT/ESO telescope is about 0.4 - 0.5 mag smaller as compared to GCs observed with the 100" telescope and 1.3 m Warsaw telescope of the Las Campanas Observatory. At the same time, Delta U_{TO}^{RGB}, the difference in U magnitude between the TO and RGB inflection (brightest) points, does not show such an apparent dependence on the characteristics of U filters used, but it depends on cluster metallicity. We have shown, for the first time, the dependence of the parameter Delta U_{TO}^{RGB} on [Fe/H] and have estimated its analytical expression, by assuming a linear relation between the parameter and metallicity. Its slope, Delta U_{TO}^{RGB}/Delta[Fe/H] ~ 1.2 mag/dex, is approximately a factor of two steeper than that of the dependence of the RGB bump position in the V magnitude on metallicity. The asymptotic giant branch (AGB) clump and features of the RGB luminosity function (LF) of M75 are also discussed.

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The Blue Straggler Population of the Globular Cluster M5

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By combining high-resolution HST and wide-field ground based observations, in ultraviolet and optical bands, we study the Blue Stragglers Star (BSS) population of the galactic globular cluster M5 (NGC 5904) from its very central regions up to its periphery. The BSS distribution is highly peaked in the cluster center, decreases at intermediate radii and rises again outward. Such a bimodal distribution is similar to those previously observed in other globular clusters (M3, 47Tucanae, NGC6752). As for these clusters, dynamical simulations suggest that, while the majority of BSS in M5 could be originated by stellar collisions, a significant fraction (20-40%) of BSS generated by mass transfer processes in primordial binaries is required to reproduce the observed radial distribution. A candidate BSS has been detected beyond the cluster tidal radius. If confirmed, this could represent an interesting case of an "evaporating" BSS.

To appear in : astro-ph/0704.0139
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A Panchromatic Study of the Globular Cluster NGC 1904. I: The Blue Straggler Population

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By combining high-resolution (HST-WFPC2) and wide-field ground based (2.2m ESO-WFI) and space (GALEX) observations, we have collected a multi-wavelength photometric data base (ranging from the far UV to the near infrared) of the galactic globular cluster NGC1904 (M79). The sample covers the entire cluster extension, from the very central regions up to the tidal radius. In the present paper such a data set is used to study the BSS population and its radial distribution. A total number of 39 bright ($m_{218} \leq 19.5$) BSS has been detected, and they have been found to be highly segregated in the cluster core. No significant upturn in the BSS frequency has been observed in the outskirts of NGC 1904, in contrast to other clusters (M 3, 47 Tuc, NGC 6752, M 5) studied with the same technique. Such evidences, coupled with the large radius of avoidance estimated for NGC 1904 ($r_{avoid} \sim 30$ core radii), indicate that the vast majority of the cluster heavy stars (binaries) has already sunk to the core. Accordingly, extensive dynamical simulations suggest that BSS formed by mass transfer activity in primordial binaries evolving in isolation in the cluster outskirts represent only a negligible (0–10%) fraction of the overall population

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EXPECTED PLANETS IN GLOBULAR CLUSTERS

Noam Soker and Alon Hershenhorn
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We argue that all transient searches for planets in globular clusters are hopeless. Planets in low metallicity stars typically don't reside at small orbital separations. The dependance of planetary system properties on metallicity is clearly seen when the quantity of the planet mass times periastron distance square (Ie) is considered. In high metallicity systems there is a concentration of systems at high and low values of Ie, with a low populated gap near Ie=0.3 (in units of Jupiter mass times AU square). In low metallicity systems the concentration is only at the higher range of Ie. Therefore, it is still possible that planets exist around main sequence stars in globular clusters, although very rarely because of the low metallicity, but at orbital periods of > 10 day. We discuss the implications of our conclusions on the role that companions can play in the evolution of their parent stars in globular clusters, e.g., influencing the distribution of horizontal branch stars on! the Hertzsprung-Russell diagram of some globular clusters.

To appear in : arXiv:0704.1067
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4. Extragalactic Clusters

Structural parameters for globular clusters in M31 and generalizations for the fundamental plane

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The structures of globular clusters (GCs) reflect their dynamical states and past histories. High-resolution imaging allows the exploration of morphologies of clusters in other galaxies. Surface brightness profiles from new Hubble Space Telescope observations of 34 globular clusters in M31 are presented, together with fits of several different structural models to each cluster. M31 clusters appear to be adequately fit by standard King models, and do not obviously require alternate descriptions with relatively stronger halos, such as are needed to fit many GCs in other nearby galaxies. The derived structural parameters are combined with corrected versions of those measured in an earlier survey to construct a comprehensive catalog of structural and dynamical parameters for M31 GCs with a sample size similar to that for the Milky Way. Clusters in M31, the Milky Way, Magellanic Clouds, Fornax dwarf spheroidal and NGC 5128 define a very tight fundamental plane with identical slopes. The combined evidence for these widely different galaxies strongly reinforces the view that old globular clusters have near-universal structural properties regardless of host environment.

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A double main sequence turn-off in the rich star cluster NGC 1846 in the Large Magellanic Cloud

A. D. Mackey and P. Broby Nielsen
University of Edinburgh

We report on HST/ACS photometry of the rich intermediate-age star cluster NGC 1846 in the Large Magellanic Cloud, which clearly reveals the presence of a double main sequence turn-off in this object. Despite this, the main sequence, sub-giant branch, and red giant branch are all narrow and well-defined, and the red clump is compact. We examine the spatial distribution of turn-off stars and demonstrate that all belong to NGC 1846 rather than to any field star population. In addition, the spatial distributions of the two sets of turn-off stars may exhibit different central concentrations and some asymmetries. By fitting isochrones, we show that the properties of the colour-magnitude diagram can be explained if there are two stellar populations of equivalent metal abundance in NGC 1846, differing in age by ≈ 300 Myr. The absolute ages of the two populations are ~ 1.9 and ~ 2.2 Gyr, although there may be a systematic error of up to ± 0.4 Gyr in these values. The metal abundance inferred from isochrone fitting is [M/H] ≈ -0.40, consistent with spectroscopic measurements of [Fe/H]. We propose that the observed properties of NGC 1846 can be explained if this object originated via the tidal capture of two star clusters formed separately in a star cluster group in a single giant molecular cloud. This scenario accounts naturally for the age difference and uniform metallicity of the two member populations, as well as the differences in their spatial distributions.

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THE STAR-FORMING REGION NGC 346 IN THE SMALL MAGELLANIC CLOUD WITH HUBBLE SPACE TELESCOPE ACS OBSERVATION. II. PHOTOMETRIC STUDY OF THE INTERMEDIATE-AGE STAR CLUSTER BS 90

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We present the results of our investigation of the intermediate-age star cluster BS 90, located in the vicinity of the H II region N 66 in the SMC, observed with HST/ACS. The high-resolution data provide a unique opportunity for a very detailed photometric study performed on one of the rare intermediate-age rich SMC clusters. The complete set of observations is centered on the association NGC 346 and contains almost 100,000 stars down to $V \simeq 28$ mag. In this study we focus on the northern part of the region, which covers almost the whole stellar content of BS 90. We construct its stellar surface density profile and derive structural parameters. Isochrone fits on the CMD of the cluster results in an age of about 4.5 Gyr. The luminosity function is constructed and the present-day mass function of BS 90 has been obtained using the mass-luminosity relation, derived from the isochrone models. We found a slope between -1.30 and -0.95, comparable or somewhat shallower than a typical Salpeter IMF. Examination of the radial dependence of the mass function shows a steeper slope at larger radial distances, indicating mass segregation in the cluster. The derived half-mass relaxation time of 0.95 Gyr suggests that the cluster is mass segregated due to its dynamical evolution. From the isochrone model fits we derive a metallicity for BS 90 of [Fe/H] $= -0.72$, which adds an important point to the age-metallicity relation of the SMC. We discuss our findings on this relation in comparison to other SMC clusters.

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5. Dynamical evolution - Simulations

The effect of stellar-mass black holes on the structural evolution of massive star clusters

A.D. Mackey, M.I. Wilkinson, M.B. Davies, G.F. Gilmore
University of Edinburgh (Mackey), University of Leicester (Wilkinson), Lund University (Davies), University of Cambridge (Gilmore)

We present the results of realistic N-body modelling of massive star clusters in the Magellanic Clouds, aimed at investigating a dynamical origin for the radius-age trend observed in these systems. We find that stellar-mass black holes, formed in the supernova explosions of the most massive cluster stars, can constitute a dynamically important population. If a significant number of black holes are retained (here we assume complete retention), these objects rapidly form a dense core where interactions are common, resulting in the scattering of black holes into the cluster halo, and the ejection of black holes from the cluster. These two processes heat the stellar component, resulting in prolonged core expansion of a magnitude matching the observations. Significant core evolution is also observed in Magellanic Cloud clusters at early times. We find that this does not result from the action of black holes, but can be reproduced by the effects of mass-loss due to rapid stellar evolution in a primordially mass segregated cluster.

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Close encounters in young stellar clusters: implications for planetary systems in the solar neighbourhood

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The stars that populate the solar neighbourhood were formed in stellar clusters. Through N-body simulations of these clusters, we measure the rate of close encounters between stars. By monitoring the interaction histories of each star, we investigate the singleton fraction in the solar neighbourhood. A *singleton* is a star which formed as a single star, has never experienced any close encounters with other stars or binaries, or undergone an exchange encounter with a binary. We find that, of the stars which formed as single stars, a significant fraction are not singletons once the clusters have dispersed. If some of these stars had planetary systems, with properties similar to those of the solar system, the planets' orbits may have been perturbed by the effects of close encounters with other stars or the effects of a companion star within a binary. Such perturbations can lead to strong planet-planet interactions which eject several planets, leaving the remaining planets on eccentric orbits. Some of the single stars exchange into binaries. Most of these binaries are broken up via subsequent interactions within the cluster, but some remain intact beyond the lifetime of the cluster. The properties of these binaries are similar to those of the observed binary systems containing extra-solar planets. Thus, dynamical processes in young stellar clusters will alter significantly any population of solar-system-like planetary systems. In addition, beginning entirely with a population of planetary systems resembling the solar system around single stars, dynamical encounters in young stellar clusters may produce at least some of the extra-solar planetary systems observed in the solar neighbourhood.

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6. Miscellaneous

On the potential of transit surveys in star clusters: impact of correlated noise and radial velocity follow-up

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(1) University of Exeter (2) Observatoire de Geneve

We present an extension of the formalism recently proposed by Pepper and Gaudi to evaluate the yield of transit surveys in homogeneous stellar systems, incorporating the impact of correlated noise on transit time-scales on the detectability of transits, and simultaneously incorporating the magnitude limits imposed by the need for radial velocity (RV) follow-up of transit candidates. New expressions are derived for the different contributions to the noise budget on transit time-scales and the least-squares detection statistic for box-shaped transits, and their behaviour as a function of stellar mass is re-examined. Correlated noise that is constant with apparent stellar magnitude implies a steep decrease in detection probability at the high-mass end which, when considered jointly with the RV requirements, can severely limit the potential of otherwise promising surveys in star clusters. However, we find that small-aperture, wide-field surveys may detect hot Neptunes whose RV signal can be measured with present-day instrumentation in very nearby (¡100 pc) clusters.

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An Assessment of HR Diagram Constraints on Ages and Age Spreads in Star-Forming Regions and Young Clusters

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California Institute of Technology University of California, Berkeley University of Alabama, Huntsville

Pre-main sequence evolutionary theory is not well-calibrated to observations. With care, the observed quantities can be converted into effective temperature and luminosity (i.e. the Hertzsprung-Russell diagram) which the theoretical calculations also predict as a function of stellar mass and age. For a sample of nearby young stellar clusters and associations ranging in age from < 1 Myr to > 100 Myr, we have tested the loci of luminosity as a function of effective temperature against various sets of predicted pre-main sequence isochrones. As we found in Hillenbrand & White (2004) which tested stellar masses, here for the stellar ages there are two conclusions: some evolutionary calculations fare better than others in reproducing the empirical sequences, and systematic differences between all pre-main sequence evolutionary calculations and the data are apparent. We also simulate hypothetical clusters of varying star formation history and compare the resulting HR diagram predictions to observed clusters. Our efforts are directed towards quantitative assessment of *apparent* luminosity spreads in star forming regions and young clusters, which are often erroneously interpreted as *true* luminosity spreads indicative of *true* age spreads.

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Also available from the URL `http://www.astro.caltech.edu/~lah/papers.html`
or by anonymous ftp at `ftp://`

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Second Announcement

Joint European and National Astronomy Meeting 2007
"Our non-stable Universe"
20-25 August, 2007
Yerevan, Armenia

JENAM is the Joint European and National Astronomy Meeting organized each year in one of the European countries jointly by the European Astronomical Society and one of the national astronomical societies. JENAM-2007 will take place in Yerevan (Armenia) and will be the 15th Annual Meeting of the European Astronomical Society (EAS) and the 6th Annual Meeting of the Armenian Astronomical Society (ArAS). JENAM consists of a number of EAS Symposia and Special Sessions on various aspects of modern astronomy (see Topics).

The JENAM will consist of 6 Plenary sessions (invited reviews on hot topics of modern astrophysics), 8 EAS Symposia, and 7 Special Sessions (SPS). The EAS Symposia will last 2-3 days each, 4 Symposia in parallel. The SPS will last 1 or 2 days each, 3 SPS in parallel. Poster sessions will be organized as well for each of the Symposia and SPS. Highlight talks for young astronomers will be organized, too. The tentative program already is available.

EAS Symposium 6 will discuss the dynamics of galaxies and galactic nuclei. The focus will be on the theoretical and dynamical modeling, and on the interface between modeling and observations. Therefore contributions to new observational results are particularly welcome as well.

Topics to be covered in EAS Symposium 6 include:

- Formation and Evolution of Galactic and Extragalactic Star Clusters
- Gravitational Waves from Dense Star Clusters and Black Holes in Galaxies
- Numerical Modeling and Computing of galaxies and star clusters
- Interaction between new astrophysical data Management and theory/modeling

For more information about the conference programme and important deadlines, please have a look at the following websites:

http://www.aras.am/JENAM-2007/ (Jenam 2007 main site)
http://www.aras.am/JENAM-2007/EASsymp06.htm (EAS Symposium 6)
http://www.ari.uni-heidelberg.de/jenam2007/EASsymp06.htm (EAS Symposium 6)

or contact the organiser of EAS Symposium 6, Rainer Spurzem (spurzem@ari.uni-heidelberg.de).

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Postdoctoral Position at the Astronomical Institute of the Academy of Sciences of the Czech Republic (AIASCR)

The Astronomical Institute of the Academy of Sciences of the Czech Republic opens temporary postdoctoral position for the year 2008. The applicant is expected to have an experience in one of the fields studied at the Astronomical Institute (see below) and to be holding a PhD at the time of arrival.

The AIASCR the largest professional astronomical institute in the Czech Republic. It is located partly at the Ondrejov Observatory (40 km from Prague) and partly in Prague. There are 10 working groups at the Institute: Physics of Solar Flares and Prominences, Structure and Dynamics of the Solar Atmosphere, Heliosphere and Space Weather, Planetary Systems, Meteor Physics, Asteroids, Physics of Hot Stars, Astrophysics of Galaxies, Relativistic Astrophysics, and High Energy Astrophysics. More information can be found at `http://www.asu.cas.cz`.

The position is open to scientists of all nations (the age limit is 40 years). The scholarship will be based on a standard domestic scale. The expected starting date is January 1, 2008 and the appointment is for one year. Extension for another year could be possible upon satisfactory scientific results, publication output and availability of funding. The candidates should send their applications (curriculum vitae, list of publications, and summary of their research work and plans) and two letters of recommendation to the director of the institute, Prof. Petr Heinzel, Astronomical Institute, Fricova 298, 251 65 Ondrejov, Czech Republic. They should indicate in the cover letter the working group they wish to work in. Applications must be received before June 15, 2007. The applicants will be notified before July 31, 2007.

9 PhD positions (doctoral positions) in the International Graduate School on "The Cosmic Matter Circuit" at the Institute of Astronomy, University of Vienna, Austria

The international graduate school (Initiativkolleg:IK) on "The Cosmic Matter Cycle" awards up to nine doctoral positions to highly qualified and motivated students starting October 1, 2007. The PhD program focuses on the various processes of the matter cycles on sub-galactic, galactic and extragalactic scales. The positions are funded for 3 years. The students are expected to hold a degree equivalent to the Austrian Diploma or Masters Degree in Astronomy/Astrophysics or a related area.

For more details, and application, see

`http://www.univie.ac.at/IK-CosmicMatterCircuit`

or contact

ik(@)astro.univie.ac.at

The deadline for applications is May 31, 2007.