REFLECTIONS

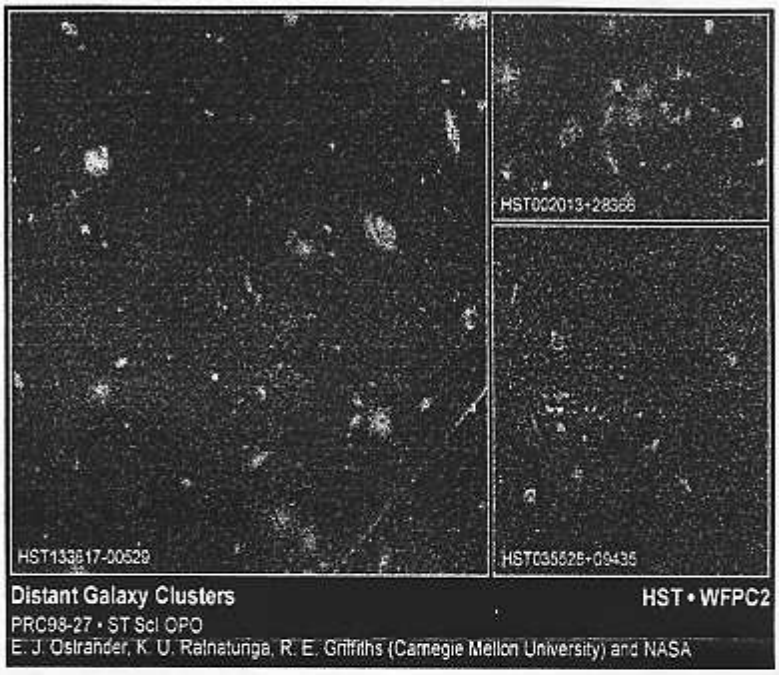
of the University Lowbrow Astronomers

September 1998

The Latest From Hubble

Far-Flung Galaxy Clusters May Reveal Fate of Universe

A survey of galaxy clusters by NASA's Hubble Space Telescope has found what could be some of the most distant clusters ever seen. If the distances and masses of the clusters are confirmed by ground-based telescopes, the survey may hold clues to how galaxies quickly formed into massive large-scale structures after the Big Bang, and what that may mean for the eventual fate of the universe.



The University Lowbrow Astronomers

is a club of enthusiasts which meets on the third Friday of each month in the University of Michigan's Physics and Astronomy building (Dennison Hall, Room 807). Meetings begin at 7:30 PM and are open to the public. Public star parties are also held twice a month, weather permitting, at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; see inside for directions) on Saturday evenings before and after the new moon. The event may be cancelled if it is cloudy or very cold at sunset. For further information, call (734) 480-4514.

This Month		Next Month and Beyond	
Sept 18	Meeting at 807 Dennison. 7:30 pm	Oct 3	"A Night On Peach Mountain / Moonwalk"
Sept 19	Open house at Peach Mountain.	Oct 16	Meeting at 807 Dennison. 7:30 pm
Sept 20	ATM meeting. Time and location TBA	Oct 17	Open house at Peach Mountain.
Sept 26	Open house at Peach Mountain.	Oct 18	ATM meeting. Time and location TBD.
		Oct 24	Open house at Peach Mountain.

-Color Contrast in Double Stars

by Mark Deprest

Most often, colors are associated with binary stars. Binaries are stars that have formed in pairs, a common occurrence in nature, Because human eyes are sensitive to contrast effects, subtle differences in the tints of these stars stand out when observed in a telescope. The colors in these stars arise from the fact that the outer layers of gas that form a star can be much different in temperature. Much like heating a piece of steel from a dull red to hotter orange and then white hot, stars display different colors depending upon their temperature. Therefore, cooler stars appear reddish or orange and the hotter stars seem white or blue-white. Binary stars form a large part of our know universe. One of the best things about observing double stars is that they can be easily seen from even light polluted areas. My backyard in the north-east corner of Ann Arbor is not by any stretch of the imagination a dark site. My only clear view is from ESE to West, and even on the best nights I can only just barely see a hint of the Milky Way, but I can see and "split" all of the double stars I will present here.

Before I give you my list of Color Contrasting Doubles, we need to talk about two more things; Separation and Position Angle (PA). Separation is the apparent distance in arc seconds one star is from its companion. So it follows that the closer the pair the harder it is the "split" them into two separate stars. Position Angle (PA) is the angle measured from the relative position of the secondary star and how that relates to a line drawn to north from the primary star. Now, if you just understood what I just wrote "you're a better man than I Gunga Din." The first question is which is the primary and which is the secondary? Well, the way I always explain it is .... the brighter of the two is the primary. Well, that works most of the time, until you get two stars of equal brightness. Then do what I do.... guess, the worst thing that can happen is your PA will be 180 degrees off. Well, then you know you guessed wrong. Now come the really fun part.... figuring out which way in your telescope is north, south east and west. Well, East and West are fairly simple, if you have a drive, turn it off. Watch the stars enter from the East and exit the FOV to the West. Now, for North move your scope toward Polaris ... the stars are now entering from the North. With a little practice you can determine a reasonable estimate of the PA of your binary. You could also make a PA ring for your scope using a paper plate and a protractor. (see me for further details)

Alright, here comes my list of Color Contrasting Doubles. Check them out and compare my colors to what you see. I think you will find that 'color' in stars is very subjective.

Beta Cygni.....3/3.5mag.....34.3"sep.....54deg.....gold/sapphire

Draconis.....4.5/7.5mag.....34.2"sep.....326deg.....orange/blue

h3945 (CMa)....4.8/6.8mag.....26.6"sep.....55deg.....gold/blue

Alpha CVn.....2.7/5.4mag.....19.4"sep.....229deg.....yellow/blue

Str872 (Aur).....6.0/7.0mag.....11.3"sep.....217deg.....gold/blue

Gamma And.....2.3/5.0mag.....9..8"sep.....64deg.....gold/blue

xi Bootis.....4.8/6.7mag.....6.6"sep.....318deg.....yellow/red

99 Herc.....5.0/5.0mag.....6.3"sep.....258deg.....green/red

Alpha Herc.....3.0/5.5mag.....4.6"sep.....104deg.....red/green

6 Trianguli.....5.0/6.6mag.....3.9"sep.....71deg.....yellow/blue

70 Ophiuchi.....4.3/6.3mag.....3.8"sep.....147deg.....yellow/red

PA and Sep are from StarList 2000 by Richard Dibon-Smtih and are plotted for 2000.0 epoch

I hope you will enjoy hunting these few down and tell me what you think. and if you find some others that fit this bill I hope you will share them with me.

A Note From Brian Ottum

Subject: StarFest

To All Lowbrows:

I just returned from Starfest, Canada's largest star party. Although it was cloudy Thursday, Friday and Saturday night (the first time in their 17 year history), it was a great event.

I highly recommend anyone going next year. I will return.

Strong points:

* very good dark sky location (Mt. Forest, clear Wed eve)
* tons of telescopes (about 700 people)
* great talks by amateurs and professionals
* very friendly Canadians
* lots of activities during the day
* Canadian dollar at an all-time low
* great swap meet (sold my old Celestron 15x80's for $250US)
* many vendors

ext year's will be in July, because most of the volunteer organizers will be in Europe for August's new moon weekend.

I'd be happy to provide more info if anyone is interested.

URLS

by Bernard Friberg

The following is a list of internet addresses on the subjects of astronomy, space, physics, math etc. This should provide many hours of enjoyment. This was prompted by a request.

University of Washington - Physics Department - http://www.phys.washington.edu/
University of Manchester. Radioastronomy Group (UK) - http://mphhpc.ph.man.ac.uk:4321/rad_astron.html
University of Pennsylvania, Math/Physics/Astronomy Library - http://www.library.upenn.edu/scitech/mpa/
La Silla - ESO Facilities - http://search.eso.org:8080/
FIGER, Don (UCLA) - http://www.astro.ucla.edu/~figer/intro.html
Warner and Swasey Observatory - Library - http://www.cwru.edu/UL/Subjects/ASTR/WSOhome.htm
PEDERSEN, Holger (Copenhagen) - http://www.astro.ku.dk/~holger/
Algorithm reference implementations, astronomical and Unix system management tools - ftp://oobleck.tn.cornell.edu/pub/
Various items including: Jiggle - a program for noninteractive mosaic assembly, Limbctr - a program for non-interactive identification of planetary limbs and centers in images, Mko2FITS - converts '80s-era UH 2.24-meter telescope CCD image files to FITS, Icarus.sty - Latex macros for formatting papers for the planetary journal Icarus, Backup network, Clues - cut-and-paste instructions for getting and installing over 75 (mostly free) software packages, Sundiskfmt - practical example of partitioning a disk in SunOS. Most items have liberal/free distribution terms.
Statistical Consulting Center for Astronomy (SCCA) - http://www.stat.psu.edu/scca/homepage.html

Questions and answers are made available on the WWW.
University of Manchester - Astronomy Group - http://www.ast.man.ac.uk/

Hartebeesthoek Radio Astronomy Observatory (HartRAO) - http://www.hartrao.ac.za/
MathSource -- Mathematica Software (Wolfram Research, Inc.) - ftp://mathsource.wri.com/
This site contains all material available through MathSource. The General directory contains items of general interest to the Mathematica community, such as administrative info, MathGroup archives, Mathematica tutorials, MathSource information, utility programs, and Mathematica tips. The Enhancements directory contains items that enhance the functionality of Mathematica beyond the capabilities of the basic kernel. Items in the Applications directory deal with the application of Mathematica to specific problems or subject areas. The subcategories group related items together into manageable sizes. Subcategories under Applications include: Audio, Chemistry, Complexity, Computer Science, Data-Tables, Economics-Finance, Education, Engineering, Geography, Graphics, Life Science, Material Science, Math, and Physics. Books supplements, periodicals, journals, press-announcements, bibliographical information, Mathematica documentation, and the like are all stored in the Publications directory. University of Oxford - Atmospheric, Oceanic & Planetary Physics. - http://www-atm.atm.ox.ac.uk/
Osservatorio Astronomico di Bologna - http://www.bo.astro.it/
Includes history, research activities, photos, preprints and a visit to the Astronomical Museum to view items from the collection.
Andrew Fruchter (STScI) - http://www.stsci.edu/~fruchter
Submillimetre Common-User Bolometer Array for the James Clerk Maxwel Telescope (SCUBA) http://www.jach.hawaii.edu/JCMT/scuba/
SCUBA is a bolometer camera for the James Clerk Maxwell Telescope operating at submillimetre and millimetre wavelengths.
NASA ADC Online Information System - http://adc.gsfc.nasa.gov/adc/archive_search.html
Coded Aperture Imaging in High-Energy Astronomy - http://lheawww.gsfc.nasa.gov/docs/cai/coded.html
Information about coded aperture imaging as applied in X- and gamma-ray astronomy: - introduction to the principle - specific details about instruments of the past, present and proposed future - bibliography.
History of Astronomy - http://www.astro.uni-bonn.de/~pbrosche/astoria.html
The first general History of Astronomy pages on the Web. These pages are maintained by the Working Group for the History of Astronomy in the Astronomische Gesellschaft
PRADHAN, Anil K. (Ohio State Univ.) - http://www-astronomy.mps.ohio-state.edu/~pradhan/
DEep Near Infrared Survey of the Southern Sky (DENIS - Meudon) - http://denisexg.obspm.fr/
This research group is part of the Paris Meudon Observatory.
Hitachi Instruments - http://www.hii.hitachi.com/
Hitachi Instruments, Inc. is a manufacturer and provider of high efficiency diffraction gratings. We offer both standard catalog components and custom made to order items.
Defense Meteorological Satellite Program Data Archive (DMSP) - http://www.ngdc.noaa.gov/dmsp/dmsp.html
DMSP is a two satellite constellation of near-polar orbiting, sun-synchronous satellites monitoring meteorological, oceanographic and solar-terrestrial physics environments. NGDC maintains an archive of all data recorded on DMSP satellites as relayed to NGDC by Air Force Global
Weather Central. Data from March 1992 to March 1994, are considered to be experimental. After March 1994, the system should be fully operational.
North Shore Amateur Astronomy Club (NSAAC) - http://www.star.net/people/~nsaac/
NSAAC is an Astronomy club of the North Shore in Massachusetts, USA

SPECTRUM -
http://www.acs.appstate.edu/dept/physics/spectrum/spectrum.html
SPECTRUM is an IBM PC-based stellar spectral synthesis program. Given a stellar atmosphere model, SPECTRUM computes the LTE synthetic spectrum. This Web site contains an introduction to SPECTRUM, full on-line documentation, and access to the ftp site for downloading SPECTRUM and auxiliary files. SPECTRUM is being made available over the Internet for the purposes of research and education.
NASA Space Science Data Operations Office (SSDOO) -
http://ssdoo.gsfc.nasa.gov/ (alternate) Working Group for the History of Astronomy: Electronic newsletters
(EMA/ENHA) - http://www.astro.uni-bonn.de/~pbrosche/aa/aa-ejourn.html
The newsletters contain announcements of conferences, exhibitions, new books, and other related material. They are available in the German original as well as in English translation.
STARLINK - http://star-www.rl.ac.uk/
The Starlink Software Collection is an anthology of astronomy applications packages and supporting subroutine libraries and utilities. It is provided by the UK Starlink Project and contributing institutions, and distributed to non-profit making organizations for use in astronomical research. At present, the collection comprises some 140 different items covering most wavebands and branches of astronomy. Most run on popular versions of UNIX. Starlink sites in the UK automatically receive regular updates, while other sites may obtain copies of the collection (and updates) on request to ussc@star.rl.ac.uk.
Large Southern Array Project (LSA) - http://iraux2.iram.fr/LSA/
The next major step in millimetre astronomy, and one of the highest-priority items in astronomy today, will be a large millimetre array with a collecting area of up to 10,000m2. This will be roughly 10 times the collecting area of today's largest millimetre array in the world, the IRAM interferometer with 5 15m diameter telescopes. With baselines foreseen to extend to 10 Km, the angular resolution provided by the new instrument will be that of a diffraction limited 4m optical telescope.
University College London - Department of Physics and Astronomy - http://www.star.ucl.ac.uk/

KRISCIUNAS, Kevin (Washington) -
http://www.astro.washington.edu/kevin/
National Center for Atmospheric Research (NCAR) -
http://www.ncar.ucar.edu/althome.html
New Mexico State University - Department of Astronomy (NMSU) -
http://charon.nmsu.edu/
Contains information on faculty, staff, and students and their research and educational activities, as well as descriptions of department astronomical facilities.
McELROY, Doug (JPL/Caltech) -
http://www.alumni.caltech.edu/~mcelroy/
A semi-personal Home Page, with some research projects I have been involved in and links to same. St. Louis Astronomical Society -
http://medicine.wustl.edu/~kronkg/slas.html
The St. Louis Astronomical Society is dedicated to promoting the interest in and advancement of the science of astronomy. It features a sky calendar and contains other items of interest to the amateur astronomer.
sci.astro.hubble (a moderated newsgroup concerned with the Hubble Space Telescope) - news:sci.astro.hubble
This newsgroup is intended to complement the substantial efforts of the Space Telescope Science Institute in Baltimore, where support of the many users of the facility originates. The group will serve as a platform for problems, requests, suggestions and needs of the scientific community as they use the Telescope to further their research. Accordingly input from the Institute to the discussions will be vital, and several members of that facility have indicated their interest and willingness to participate fully.
There is an Archive for the newsgroup. This archive is intended for materials pertinent to the discussions in the newsgroup

sci.astro.hubble, part of the USENET news structure. Valid items for placement here are large datasets, public domain software (in compressed tarfile form), imagery (GIF preferred) and Postscript renderings of relevant papers on the topic of data processing in connection with Space
Telescope. - README ,
The archive contains a form which executes WAIS searches on the archive.
Sky Online - http://www.skypub.com/
Sky Online, a service of Sky & Telescope magazine, is designed for astronomy enthusiasts at all levels of interest. I
International Ultraviolet Explorer Satellite (IUE) -
http://iuewww.gsfc.nasa.gov/
Royal Astronomical Society of Canada (RASC) -
http://www.rasc.ca/
The beginnings of "The Royal Astronomical Society of Canada" (RASC) go back to the middle of the nineteenth century. The Society was incorporated within the province of Ontario in 1890, received its Royal Charter from King Edward VII in 1903, and was federally incorporated in 1968. The National Office of the Society is located at 136 Dupont Street, Toronto, ON, M5R 1V2, telephone (416) 924-7973, e-mail
rasc@vela.astro.utoronto.edu. The business office and library are housed there.
NRAO Charlottesville (NRAO-CV) - http://www.cv.nrao.edu/
This web page contains links to these items, among others: AIPS (Astronomical Image Processing System), AIPS++, NRAO Headquarters, The Central Development Lab, and the main NRAO Library.
Company Seven Astro-Optics Division -
http://www.company7.com/
Company Seven Astro-Optics Division is a firm that is involved in the design, manufacture, resale, and service of astronomical telescopes and related systems. Credentials include support of mission critical aspects of the NASA International Comet Halley Watch, the Hubble Space Telescope Repair Mission, and a variety of Defense and Law Enforcement projects. The Company sponsors a showroom and museum displaying rare new and
antique telescopes, binoculars, and optics in Laurel, Maryland, U.S.A.
James Clerk Maxwell Telescope (JCMT) -
http://www.jach.hawaii.edu/JCMT/
The 15-m JCMT is situated close to the summit of Mauna Kea, Hawaii and is the largest submillmetre facility in the world It is

wned and operated by the UK, Canada (see HIA JCMT pages) and the Netherlands on behalf of astronomers worldwide. Its home page contains information about the site, the antenna and the instrumentation, as well as a description of the JCMT-CSO interferometer, and details of the various time allocation processes.
University of Southampton - Astronomy Group - http://www.astro.soton.ac.uk/
American Association for the Advancement of Science (AAAS) - http://www.aaas.org/
The Editor of Science.
Netherlands Foundation for Research in Astronomy (NFRA) - http://www.nfra.nl/
University of Maryland - Planetary Data System (PDSSBN) - http://pdssbn.astro.umd.edu/
This node is currently located in the Astronomy Department of the University of Maryland, College Park. It supports the publicly accessible files for the Planetary Data System Small Bodies Node, and the Shoemaker-Levy 9 Bulletin Board.
NASA Scientific and Technical Information (STI) - http://www.sti.nasa.gov/STI-homepage.html
Northwestern University - Astronomy (NWU) - http://www.astro.nwu.edu/
Contents include information on undergraduate studies and graduate studies, who we are, what we do, and our gallery of gamma-ray bursts as observed by the Oriented Scintillation Spectrometer Experiment (OSSE) on board the Compton Gamma-Ray Observatory (CGRO).
Linux for Astronomy CDROM project (LfA) - http://www.randomfactory.com/lfa.html
The Lfa CDROM contains Linux versions of the following Astronomical data reduction and analysis packages : AIPS (radio astronomy and image processing) ASSIST (gui for IRAF +) glish (distributed processing) IRAF + contributed packages (general purpose) Karma (image processing) NEMO (stellar dynamics) MIDAS (general purpose) PGPERL (graphics) SAOIMAGE (imaging/graphics) SAOtng (imaging/graphics) StarBase (astronomy database).
Einstein Data Archive (SAO, Cambridge, MA) - http://hea-www.harvard.edu/einstein/Ein_home/ein_welcome.html
The Einstein Observatory was a satellite based imaging X-ray telescope in operation from November 1978 to April 1981. The focal plane detectors included two Imaging Proportional Counters (IPC), three High Resolution Imagers, an Objective Grating Spectrometer (OGS), a Focal Plane Crystal Spectrometer (FPCS) and a Solid State Spectrometer (SSS). The most commonly used instrument was the IPC, which made nearly 4000 observations of astronomical sources. This page gives information about the Einstein data archive, and about access to Einstein Data.
NRL Solar Physics Branch (NRL) - http://wwwsolar.nrl.navy.mil/
There are three active experimental programs in the Solar Physics Branch: The Large Angle Coronagraph-Spectrograph (LASCO) experiment is one experimental package aboard the Solar and Heliospheric Observatory (SOHO), a joint ESA/NASA mission, which was launched on December 2, 1995. LASCO is now producing coronal images from all three of its coronagraphs. The Solar Ultraviolet Spectral Irradiance Monitor (SUSIM) experiment begun on October 11, 1991 aboard the Upper Atmosphere Research Satellite (UARS) continues to measure the solar UV spectral irradiance. The High Resolution Telescope and Spectrograph (HRTS) experiment has collected spectroscopic observations of the Sun while flying on suborbital rockets since its first flight in 1975.
COWLEY, Charles R. (U. Michigan) - http://www.astro.lsa.umich.edu/users/cowley/
NCSA AipsView Visualization System (AipsView) - http://monet.ncsa.uiuc.edu/AipsView/av.html
AipsView is a tool for visual data analysis built at NCSA with support from the NSF/ARPA Grand Challenge project in Radio Astronomy Imaging, and in cooperation with the AIPS++ programming project. AipsView is a tool for two-dimensional visualization and relies on Motif and Xlib for its user interface and drawing capabilities. A companion tool for three-dimensional visualization, AipsView3, requires OpenInventor. AipsView3 is at an early stage of development, and is not yet described on these pages.
Astronomical software on top of Linux - http://bima.astro.umd.edu/nemo/linuxastro/
A list of astronomical software available on top of the Linux/Unix operating system.
Antarctic Muon and Neutrino Detector Array (AMANDA) - http://amanda.berkeley.edu/
Remote Access Astronomy Project (RAAP) - http://www.deepspace.ucsb.edu/rot.htm
The Remote Access Astronomy Project (RAAP) is an educational outreach program that promotes interest in science through providing astronomy educational resources. These include a series of digital image processing exercises to teach a variety of physical concepts as well as access to our computer controlled telescope allowing motivated students design and carry out their own experiments.
Starcat (ESO) - http://archive.eso.org/starcat/
July 1998: STARCAT is now becoming obsolete. Use it only to access astronomical catalogues or request special file types. Use WDB instead.
Rome Observatory Astronomical Museum - http://www.rm.astro.it/museo/museo.html
Historical Astronomical Museum, with description cards and some pictures
Astronomy information leaflets - http://www.ast.cam.ac.uk/RGO/leaflets/
These WWW pages form part of a series of astronomical pamphlets distributed by the Royal Greenwich Observatory. Information includes:
The Solar System and the most distant object in it, as well as the objects that have come closest to the earth; What is a star? Aurorae; The Twenty Five brightest stars and the Thirty closest stars; The Galileo, Hipparcos, and Cassini satellites; Telescopes; Meridian Astronomy; The surface temperatures of the planets; Cosmology and Galaxies; Day and Night and the seasons including Summer Time and information on Lighting-up time, sunrise, sunset and twilight; About Time: The calendar, the date of Easter, the equation of time, and leap years. Also the year 2000 AD; Tides; Supernovae, pulsars, and Black Holes; Photometry - measuring the brightnesses of stars; Eclipses, including the total lunar eclipses on 1992 December 9 and 1993 November 29; How stars and other objects get their names;

Space travel and the shuttle missions in 1993 The Satellite Laser Ranger; The use of Computers at the RGO; Sundials and the Greenwich Water Tanks Mediterranean Association of Environmental and Space Sciences (AMSEE) -
http://cic.cstb.fr/amsee/
The "Association Mediterranenne des Sciences de l'Environnement et de l'Espace" or Mediterranean Association of Environmental and Space Sciences is a non profit organisation established late 1990. Since then the Association has installed two telescopes, one designed for the observation of planets and double stars under the Mosser Dome and another for deep sky observing under the Messier Dome. CCDs observing for amateur size telescope has been the major interest of the members since the beginning. The AMSEE observing facilities have been installed on the French Riviera at 1220 meters above the sea level on a 7,8 acre piece of land. Synergies have been developed with the Observatoire de la Cote d'Azur (OCA) and many other bodies. The projects undertaken by AMSEE are described in the server, which includes the finest images made with the observatory facilities.
Parallel Virtual Machine (PVM) - http://www.netlib.org/pvm3/
PVM (Parallel Virtual Machine) is a software system that enables a collection of heterogeneous computers to be used as a coherent and flexible concurrent computational resource. The individual computers may be shared- or local-memory multiprocessors, vector supercomputers, specialized graphics engines, or scalar workstations, that may be interconnected by a variety of networks, such as ethernet, FDDI, etc.
http://www.star.ucl.ac.uk/~hwm/
Wyoming Infrared Observatory (WIRO) -
http://faraday.uwyo.edu/wiro/

Amateur Astronomers' Association of Princeton (AAAP) -
http://www.princetonol.com/eye/aaap.html
Home Page for the Amateur Astronomers' Association of Princeton (New Jersey). Includes information about club activities, program schedule, and special events.
Penn State Astronomy Camps and Workshops -
http://www.outreach.psu.edu/PSIWA/
The Penn State Department of Astronomy & Astrophysics is offering workshops for science teachers, and one-week astronomy camps for students entering grades eight through ten.
1st High Energy Astrophysics Observatory (HEAO 1. GSFC. NASA) -
http://heasarc.gsfc.nasa.gov/docs/heasarc/missions/heao1.html
The first of NASA's three High Energy Astronomy Observatories, HEAO 1 was launched aboard an Atlas Centaur rocket on 12 August 1977 and operated until 9 January 1979. During that time, it scanned the X-ray sky almost three times over 0.2 keV - 10 MeV, provided nearly constant monitoring of X-ray sources near the ecliptic poles, as well as more detailed studies of a number of objects through pointed observations.
StatLib Index - http://lib.stat.cmu.edu/
StatLib, a system for distributing statistical software, datasets, and information by electronic mail, FTP, gopher, and WWW. StatLib started out as an e-mail service and some of the organisation still reflects that heritage.
The Des Moines Astronomical Society, Inc. (DMAS) -
http://www.sciowa.org/~dmas/
The Des Moines Astronomical Society is a non-profit, 501(c)(3) organization commited to sharing astronomy with the public of central Iowa. The society maintains the Ashton-Wildwood Observatory in Jasper County, 30 miles northeast of Des Moines. The observatory is a twin-dome design and houses a 16-inch Newtonian telescope and a 10-inch Meade Schmidt-Cassigrain CAT telescope. The society sponsors several lectures beginning in March and ending in late October.
Automated Telescopes -
http://www.eia.brad.ac.uk/rti/automated.html
Links to Automated telescopes on the Internet.
Astronomy freeware - http://www.cvc.org/astronomy/freeware.htm
A description of useful astronomy freeware and software field tested in the classroom with download links
Space Physics Resources on the Internet -
http://ousrvr2.oulu.fi/%7Espaceweb/walker.html
University of New Hampshire - High Energy Astrophysics Group -
http://wwwgro.unh.edu/
COMPTEL Project
Astronomie / Astronomy (at IfAG Potsdam) -
http://www.potsdam.ifag.de/server/astro.html
SEDS - Astronomical Anonymous FTP Sites (SEDS: Astro-FTP list) -
http://seds.lpl.arizona.edu/pub/faq/astroftp.html
This is a concise description of anonymous-ftp file servers containing astronomy and space research related material. It includes only those servers where there are special subdirectories for astro stuff or much material included into a general directories. For sites with multiple directories of interest, the list points towards a common top-level directory. (NOTE: until August 1994, this list of servers was maintained in Finland.)
A List Supernova Pages on the WWW -
http://rsd-www.nrl.navy.mil/7212/montes/sne.html
Links to a growing list of WWW pages >concerning all aspects of research on supernova and supernova remnants. Observations and theory; all types
of supernovae; research groups and individual researchers.
Open positions at Danish Space Research Institute (DSRI) -
http://www.dsri.dk/positions.html
Universiteit Utrecht - Sterrenkundig Instituut -
http://www.fys.ruu.nl/~wwwstk/
Osservatorio Astronomico di Torino (OATo) -
http://otoxd2.to.astro.it/
Department of Physics & Astronomy, College of Charleston -
http://www.cofc.edu/~physics/physdept.html
Universiteit Utrecht - Sterrenkundig Instituut: Preprints -
http://stkwww.fys.ruu.nl:8000/preprint.html
Sciencejobs database of New Scientist -
http://www.sciencejobs.com/sciencejobs/sciencejobs.html
The New Scientist Planet Science recruitment database offers a comprehensive listing of current scientific, technological and academic
vacancies available on the Web.
WALSH, Wilfred (ATNF) -
http://wwwatnf.atnf.csiro.au/people/wwalsh/
WebStars (Astrophysics in Cyberspace) -

ttp://heasarc.gsfc.nasa.gov/docs/www_info/webstars.html
WebStars, now at NASA's High Energy Astrophysics Science Archive
Research Center.
MURPHY, Edward (JHU) - http://www.pha.jhu.edu/~emurphy/
La Palma - Isaac Newton Group - Schedules (ING) -
http://ing.iac.es/schedules/schedule.html
ELIZALDE, Flavio (INPE/DAS) -
http://crux.das.inpe.br/~elizalde/elizalde.html
The Astrophysical QuickView (AQV) -
http://www.dreamscape.com/biology/
This is a collection of informative quick summaries of new press releases .
High Energy Physics Information Center (HEPIC) -
http://www.hep.net/
Physics Department New Mexico Institute of Mining & Technology
http://www.physics.nmt.edu/NMTphysicsb.html
Malin Space Science Systems, Inc. (MSSS) -
http://link.springer.de/link/service/journals/00770/index.htm
Shaukat on Moon Sighting (Earliest Crescent Moon Sighting) -
http://www.erols.com/shaukat/sksmoon.html
Earliest visibility of moon across the globe, calculated by the latest criterion developed by Shaukat
DANNER, Rudolf (CalTech / MPE) - http://astro.caltech.edu/~rmd/
Astronomy! A Brief Edition -
http://www.astro.uiuc.edu/~kaler/AstroBrief/
The site supplements the textbook "Astronomy! A Brief Edition," and gives links relevant to each chapter in the book as well as updates on new developments and discoveries in astronomy.
CHROMEY, Fred (Vassar College) -
http://noether.vassar.edu/Chromey.html
LAGUNA, Pablo (Penn State Univ.) -
http://www.astro.psu.edu/users/pablo
BENEDICT, Fritz (McDonald) -
http://clyde.as.utexas.edu/GFBDefault.html
University of Virginia - Astronomy Department -
http://www.astro.virginia.edu/
University of New Mexico - Institute For Astrophysics (UNM) -
http://www.phys.unm.edu/ifa/
Links and services which are related to astrophysics and astronomy at UNM.
Stars (Portraits of Stars and their Constellations) -
http://www.astro.uiuc.edu/~kaler/sow/sow.html
"Stars" introduces a new star each week, describing it at a beginning level. The site gives constellation pictures showing the star and also features a general introduction to stars and their evolution.
MIT Laboratory for Nuclear Science (LNS) -
http://www-lns.mit.edu/
Anglo-Australian Telescope - Schedules (AAT) -
http://www.aao.gov.au/aat_schedule.html
DEEPSKY 2000 (Steve Stuma) - http://www.deepsky2000.com/
GLAZEBROOK, Karl (IoA-Cambridge) -
ttp://www.ast.cam.ac.uk/~kgb/
Atics Express - http://epubs.osa.org/opticsexpress/
Wnational electronic journal of optics, launched in July 1997.
ts new developments in optical science and technology on a biweekly basis. Published by Optical Society of America (OSA).
New Mexico State Univ Astronomy Preprints (NMSU) -
http://charon.nmsu.edu/PREPRINTS/preprint.html
Zoomer Personal Digital Assistant - http://www.grot.com/zoomer/
Eugene Astronomical Society (EAS on the WWW) -
http://www.efn.org/~bsackett/
The Eugene Astronomical Society in Eugene, Oregon provides access to information about Astronomy, telescopes, meeting information, and members. Also available are links to Web formatted versions of it's newsletter, 'Io'
CRABTREE, Dennis (CFHT) -
http://www.cfht.hawaii.edu/~crabtree/crabtree.html
CFHT Bulletins - http://www.cfht.hawaii.edu/bulletins/
Rothney Astrophysical Observatory (RAO) -
http://www.acs.ucalgary.ca/~milone/rao.html
RAY, Paul (NRL) - http://www.srl.caltech.edu/personnel/paulr/
PHILIP, A. G. Davis (Union College) -
http://www1.union.edu/~agdp
University of New South Wales - School of Physics (UNSW) -
http://www.phys.unsw.edu.au/
UCLA Institute of Geophysics and Planetary Physics Space Science Center
- http://www-ssc.igpp.ucla.edu/
Magnetospheric physics, Solar Wind Coupling and Geomagnetic Activity, Space Simulations and Space Physics
Aarhus University - Institute of Physics and Astronomy -
http://www.dfi.aau.dk/
VOURLIDAS, Angelos (NRAO) -
http://sundog.caltech.edu/avourlid/home.html

International Supernovae Network (ISN) -
http://www.queen.it/web4you/noprofit/isn/isn.htm
The Network has the purpose to help contacts and share information among supernovae enthusiasts both amateurs and astronomers worldwide.
SZYMANSKI, Michal (Warsaw University Obs.) -
http://www.astrouw.edu.pl/~msz/personal.html
SUNY Stony Brook Astronomy Group -
http://www.ess.sunysb.edu/astro/ <

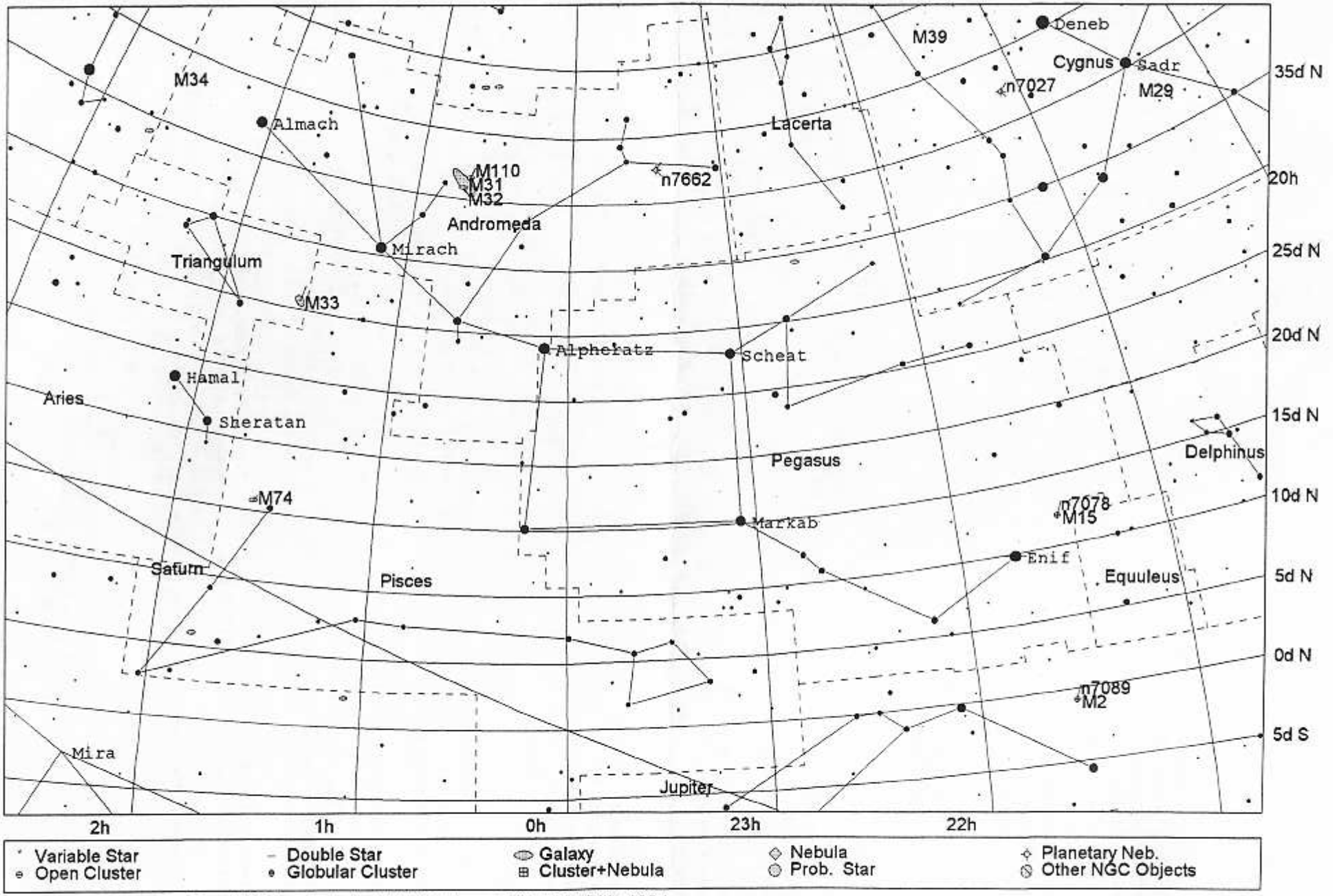
Recent News and Observations

Credit: NASA AND JPL

Last Updated: 4 September 1998
Headlines New comet 1998 Q1 (LINEAR) (8/26)

Long-Period Comets

C/1995 O1 (Hale-Bopp) is ~9.8 (6/24)
C/1997 J2 (Meunier-Dupouy) is about 11 (9/3)
C/1998 J1 (SOHO) is at m1[12.5 (8/17)
C/1998 K2 (LINEAR) is ~13 (7/28)
C/1998 K5 (LINEAR) is ~12.7 (9/3)
C/1998 M2 (LINEAR) is ~13 (9/4)
C/1998 M5 (LINEAR) is ~11.3 (9/3)
C/1998 P1 (Williams) is ~8 (9/4)
C/1998 Q1 (LINEAR) is ~114.6 (8/28)



Center RA:23h 37m Dec: 24d 19m N Date: 9/15/98 Time: 1:09 PM Width: 125d

nort-Period Comets

21P/Giacobini-Zinner is ~11 (9/1)
29P/Schwassmann-Wachmann 1 is about 15.5 (7/28)
52P/Harrington-Abell is ~12.4 (9/4)
68P/Klemola is ~15 (9/1)
88P/Howell is ~11.6 (8/24)
93P/Lovas 1 is ~14 (9/1)

Headlines
Last Updated: 28 August 1998

C/1998 Q1 (LINEAR)

IAU Circular 6995 (Aug. 25, 1998) reports the discovery of comet by the Lincoln Laboratory Near-Earth Asteroid Research (LINEAR) project. A preliminary parabolic orbit on IAU Circular 6996 (Aug. 25, 1998) indicates that perihelion was on June 28, 1998 at a distance of 1.56 AU. The comet is currently about 15.5 magnitude and is expected to fade as it moves away from both the Earth and Sun.

C/1998 P1 (Williams)

IAU Circular 6986 (August 11, 1998) reports the visual discovery of a new comet by Peter Williams of Heathcote (near Sydney), Australia. The comet is reported to be m1=9.5 although our first reported observation by Michael Mattiazzo (Wallaroo, South Australia) puts the comet a full magnitude brighter. Garradd's CCD image shows an 8' coma with a short tail. IAU Circular 6988 (August 12, 1998) gives a preliminary orbit for this comet. Perihelion will be on Oct. 16.95, 1998 with a perihelion distance of 1.16 AU. Even though the comet is approaching perihelion, it is moving away from the Earth. Thus, the comet's brightness is expected to fade slightly as it approaches perihelion. The comet will drift towards solar conjunction in the evening sky as it approaches perihelion. It will remain a Southern hemisphere object during this period. In late Novemeber, the comet will emerge from morning twilight as a 10th magnitude object visible from both hemispheres. It will slowly fade as it moves north and west.

-Announcements:

Do you have E-mail capability and you do not treceive the Lowbrow E-mail messages? Please notify Kurt Hillig (khillig@umich.edu) ,or Doug Scobel (djscobel@ann-arbor.applicon.com)

Dues:

Membership dues are $20 per year for individuals or families, and $12 for students.

Checks made out to: University Lowbrow Astronomers and mailed to Doug Scobel, 1426 Wedgewood Drive, Saline MI 48176 .

Magazine Subscriptions :

As a member of the Lowbrows, you are entitled to substantial discounts on *Sky and Telescope* and *Astronomy* magazines. To qualify for the discount, however, you must submit all subscription requests through the club treasurer. Make the check payable to "University Lowbrow Astronomers."

The current magazine subscription rates are:

	Normal Rate	Club Rate	Savings
*Astronomy**	$34.95	$20.00	$14.75
*Sky and Telescope***	$36.00	$27.00	$9.00

*Club rate allowed on 1 or 2 year subscriptions.
**Club rate allowed only on 1-year subscription. *NOTE*: For non-magazine purchases, simply mention your club affilliation and send your order in directly to the publisher(s).

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Articles and pictures may be sent to the following:

Bernard Friberg	Bfriberg@aol.com
Chris Sarnecki	chrisani@aol.com

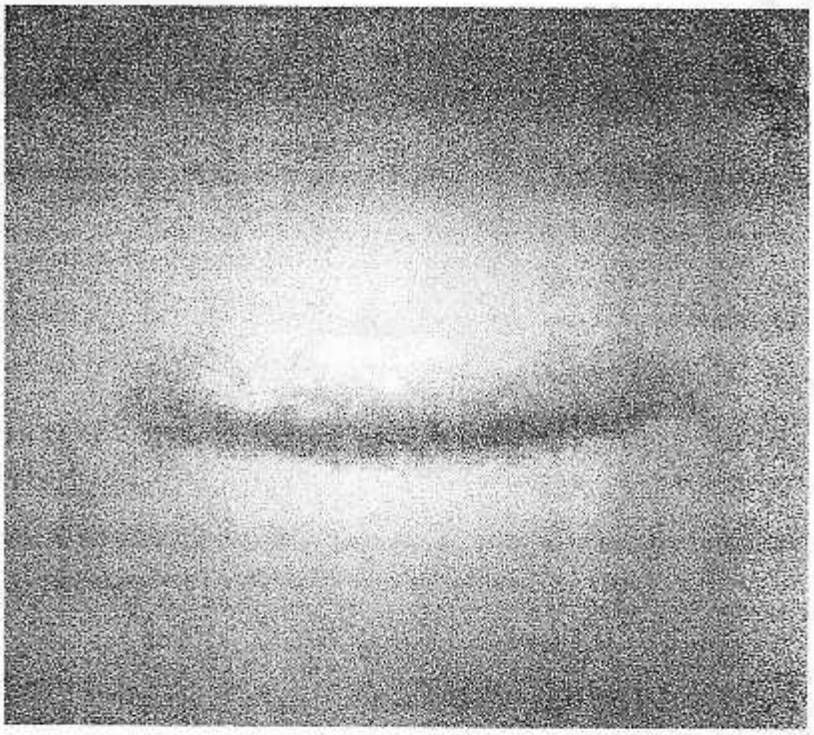
Home Page Address:

http://www.astro.lsa.umich.edu
This is the University of Michigan Astronomy Dept. home page. Click on Public and then University Lowbrow Astronomy.
The more direct route to the Lowbrow home page is the following address.
http://www.astro.lsa.umich.edu/lowbrows.html

Monthly Meeting:
Sept 18, 1998
@ 7:30 pm

Room 807 Dennison Hall (Physics and Astronomy Building) at the University of Michigan

Rudi Lindner on the topic
"Why Men Go Mad in the Veld't
Lamont- Hussey Observatory"
(This is U of M astronomy history at its best).



Resembling a gigantic hubcap in space, a 3,700 light-year-diameter dust disk encircles a 300 million solar-mass black hole in the center of the elliptical galaxy NGC 7052.

The disk, possibly a remnant of an ancient galaxy collision, will be swallowed up by the black hole in several billion years.
Because the front end of the disk eclipses more stars than the back, it appears darker. (Credit NASA and the HST)

University Lobrow Astronomers
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Ann Arbor, MI 48105

Check your membership expiration date on the mailing label!