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Minor mergers have massive consequences for black holes

By Dr. Ethan Siegel

When you think of our sun, the nearest star to our world, you think of an isolated entity, with more than four light years separating it from its next nearest neighbor. But it wasn't always so: billions of years ago, when our sun was first created, it very likely formed in concert with thousands of other stars, when a giant molecular cloud containing perhaps a million times the mass of our solar system collapsed. While the vast majority of stars that the universe forms—some ninety-five percent—are the mass of our sun or smaller, a rare but significant fraction are ultra-massive, containing tens or even hundreds of times the mass our star contains. When these stars run out of fuel in their cores, they explode in a fantastic Type II supernova, where the star's core collapses. In the most massive cases, this forms a black hole.

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President's Article

By Tim Campbell

Silent Auction & Sirius Award

At the December club meeting, the club held a silent auction to make equipment available to club members that the club cannot use. Some of the equipment was already owned by the club, but much of the equipment was part of the generous donations from Maria Comninou and numerous items donated to the club by Bob FitzGerald.

The silent auction was organized through the great efforts of George Korody, Bob MacFarland, Doug Bauer, Jim Frisbie, Ellen Duncan, and Gordon Hansen.

Bob MacFarland reported at the last board meeting that approximately 2/3rds of the items were sold at the auction. Gordon reported that the club raised a little over \$600 through the sale (I believe some remaining items have have sold since that report). Bob MacFarland has updated the list of remaining items still available for purchase on the Yahoo Group.

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STAR STUFF

January 2015 - Vol. 25 No 1

STAR STUFF is published eleven times each year by:

FORD AMATEUR ASTRONOMY CLUB
P.O. Box 7527
Dearborn MI 48121-7527

PRESIDENT: Tim Campbell
VICE PRESIDENT: Art Parent
SECRETARY: Ellen Duncan
TREASURER: Gordon Hansen
WEBMASTER: Greg Ozimek
NEWSLETTER EDITOR: Jennifer Monske

Club Information:

The Ford Amateur Astronomy Club (FAAC) meets on the fourth Thursday each month, except for the combined November/December meeting on the first Thursday of December - at Henry Ford College Administration Services and Conference Center in Dearborn. Refer to our website for a map and directions (www.fordastronomyclub.com).

The FAAC observes at Spring Mill Pond within the Island Lake State Recreation Area near Brighton, Michigan. The club maintains an after-hours permit, and observes on Friday and Saturday nights, and nights before holidays, weather permitting. The FAAC also has use a private observing site near Gregory Michigan and Lake Erie Metro Park. See the FAAC Yahoo Group* for more information.

Observing schedules and additional info are available on our website, or via the FAAC Yahoo Group.* Or call the FAAC Hotline, for info and leave a message, or ask questions: 313-757-2582. or send email inquiries to info@fordastronomyclub.com.

Membership in the FAAC is open to anyone with an interest in amateur astronomy. The FAAC is an affiliate of the Ford Employees Recreation Association (F.E.R.A.). Membership fees:

Annual - New Members: \$30 (\$15 after July 1)
Annual - Renewal: \$25 (\$30 after January 31)

Membership includes the STAR STUFF newsletter, discounts on magazines, discounts at selected area equipment retailers, and after-hours access to the Island Lake observing site.

Astronomy or Sky & Telescope Magazine Discounts

Obtain the required form from the FAAC club treasurer for a \$10 discount. Send the completed form directly to the respective publisher with your subscriptions request and payment. Do not send any money directly to the FAAC for this.

Star Stuff Newsletter Submissions

Your submissions to STAR STUFF are welcome! Send your story and/or images to the editor: StarStuff@fordastronomyclub.com. Email text or MS Word is fine. STAR STUFF will usually go to press the weekend prior to each general meeting. Submissions received prior to the 15th can be included in that issue.

* FAAC Members are welcome to join our Ford Astronomy Club Yahoo!Group. Messages photos, files, online discussions, and

This month's background photos of the moon Page 1 courtesy of John Kirchhoff. See more of John's photos at:

<http://www.flickr.com/photos/33926475@N06/with/4311533997/>

I would like to recognize those who worked to make all of this possible. I am always sincerely grateful for the help of our club volunteers and always afraid that I might be remiss in remembering each name. As I am sometimes am guilty of poor recall, should I ever fail to mention anyone, please do not mistake it for a lack of genuine gratitude. This list includes:

George Korody, who worked with our donor, Maria Comninou, to collect and store the equipment.

Doug Bauer, who worked with George to categorize and label all of the equipment and build "sets" for loan out and special events.

- Bob MacFarland, who also worked with Doug and George to categorize the equipment, and who also did considerable work to organize and operate the silent auction. Bob did much of the "paperwork" behind the management and sale of the equipment.

- Ellen Duncan, who helped with the silent auction format and auction sheets.

- Jim Frisbie, who did considerable research to identify the value of each item (a considerably long list) for pricing in the auction.

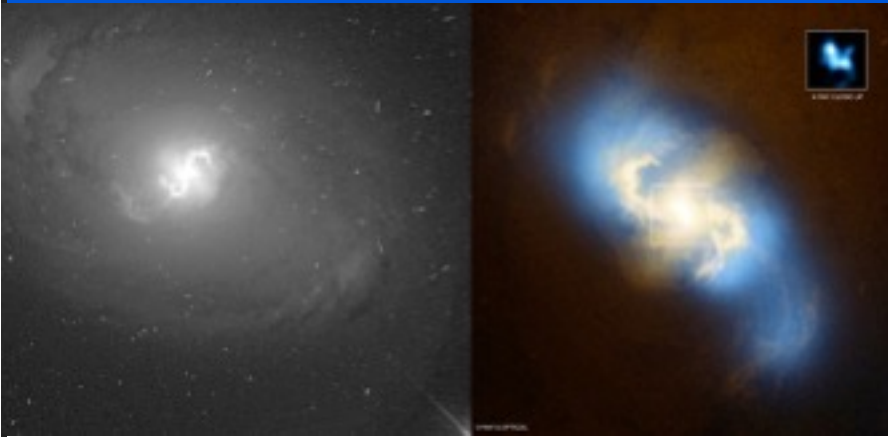
- Gordon Hansen, who managed the finances associated with the sale.

I would especially like to thank our generous donors, Maria Comninou and also Bob FitzGerald. It is our great loss that Bob is no longer with us. The equipment committee and the board are working to to recognize and thank Maria Comninou for her generosity.

Speaking of recognizing people... as a reminder it is time to submit your nominations for the club's annual Sirius Award. This award will be presented to the recipient at the club's annual banquet scheduled for Saturday May 2nd. The award is presented to the recipient, selected as our "brightest star" typically in recognition for their service and efforts both to the club as well as outreach efforts to the public.

Any club member may be nominated with the exception of current officers (past officers can be nominated) or previous Sirius Award winners.

To submit your nominations (you may submit as many names as you wish) please email them to president@fordastronomyclub.com. Please include some words to indicate why you have selected these nominees (the nominations are all distributed to the board for selection of the award recipient.)



Images credit: NGC 3393 in the optical (L) by M. Malkan (UCLA), HST, NASA (L); NGC 3393 in the X-ray and optical (R), composite by NASA / CXC / SAO / G. Fabbiano et al. (X-ray) and NASA/STScI (optical).

Minor mergers have massive consequences for black holes

(continued from Page 1)

Over time, many generations of stars—and hence, many black holes—form, with the majority eventually migrating towards the centers of their host galaxies and merging together. Our own galaxy, the Milky Way, houses a supermassive black hole that weighs in at about four million solar masses, while our big sister, Andromeda, has one nearly twenty times as massive. But even relatively isolated galaxies didn't simply form from the monolithic collapse of an isolated clump of matter, but by hierarchical mergers of smaller galaxies over tremendous timescales. If galaxies with large amounts of stars all have black holes at their centers, then we should be able to see some fraction of Milky Way-sized galaxies with not just one, but multiple supermassive black holes at their center!

It was only in the early 2000s that NASA's Chandra X-ray Observatory was able to find the first binary supermassive black hole in a galaxy, and that was in an ultra-luminous galaxy with a double core. Many other examples were discovered since, but for a decade they were all in ultra-massive, active galaxies. That all changed in 2011,

with the discovery of two active, massive black holes at the center of the regular spiral galaxy NGC 3393, a galaxy that must have undergone only minor mergers no less than a billion years ago, where the black hole pair is separated by only 490 light years! It's only in the cores of active, X-ray emitting galaxies that we can detect binary black holes like this. Examples like NGC 3393 and IC 4970 are not only confirming our picture of galaxy growth and formation, but are teaching us that supermassive relics from ancient, minor mergers might persist as standalone entities for longer than we ever thought!

Check out some cool images and artist reconstructions of black holes from Chandra: <http://chandra.harvard.edu/photo/category/blackholes.html>

Kids can learn all about Black Holes from this cool animation at NASA's Space Place: <http://spaceplace.nasa.gov/black-holes>.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Treasurer's Report January 11, 2015

By Gordon Hansen

Jan 11, 2015

ASSETS

Current Assets

Checking/Savings

10000 · Checking 135.23

11000 · FAAC Savings

11100 · FAAC Club Savings 1,608.55

11200 · Equipment 2,097.36

11300 · Scholarship 358.26

11400 · GLAAC 5,266.18

Total 11000 · FAAC Savings 9,330.35

12000 · Petty Cash Account 160.25

13000 · CD's

13100 · CD 200599272 1,061.08

13200 · CD 205196033 1,005.82

13300 · CD 89265268 1,109.04

Total 13000 · CD's 3,175.94

Total Checking/Savings 12,801.77

Total Current Assets 12,801.77

TOTAL ASSETS 12,801.77

Meeting Agenda - January 22nd

HFC – Berry Auditorium -Admin. Services & Conference Center www.fordastronomyclub.com
5:30

Opening/Introduction/Member Observing

Main Presentation:

Asteroids, Near Earth Objects, and Meteorites

Bob Trembley

Club Projects/Committees/Member Support

Club Business/Secretary/Treasurer/Equipment Reports

Election of Club Officers

FAAC Equip Report 1/11/15

By Dennis Salliotte

| Item | Currently Held By: | Date Last Verified |
|----------------------------------------|--------------------|--------------------|
| Telescopes | | |
| 4" Dobsonian | George Korody | 1/18/14 |
| TK5 4 1/2 " Galileo Alt/Az Reflector | Dennis Salliotte | 1/11/15 |
| TK6 8" Orion 8XTi Dobsonian | Patrick Lawton | 10/23/14 |
| 4" Donated Reflector in need of repair | George Korody | 1/18/14 |
| TK3 Celstrn 130 Newt Goto mount | Liam Finn | |
| TK4 Clstrn 90 Refretr w/ man mount | Liam Finn | |
| Binoculars | | |
| BK3 15x70 binocs, monopod mount | Bob MacFarland | 1/11/15 |
| BK4 20x80 binocs, altaz goto mount | Sandra Macika | |
| BK5 25x70 binocs w/tripod adaptor | Tim Dey | 1/11/15 |
| Item | Currently Held By: | Date Last Verified |
| Telescopes | | |
| 4" Dobsonian | George Korody | 1/18/14 |
| TK5 4 1/2 " Galileo Alt/Az Reflector | Dennis Salliotte | 1/11/15 |
| TK6 8" Orion 8XTi Dobsonian | Patrick Lawton | 10/23/14 |

Astro Imaging SIG

Gordon Hansen

All are invited to join us in the Astro Imaging SIG meetings, to share and discuss images, experiences, and techniques.

We always have a good time, with lively discussion, and sharing of valuable information.

Next meeting is **February 12th**. The meeting room location – HFCC Admin. Services and Conference Center (same building), Berry Amphitheater Auditorium.

Topics invited. Pizza served.

FAAC Events 2015

January 22nd - General Club meeting

February 12th - Astro Imaging SIG meeting

Background Photo from Lunt Solar Scope Image taken at the Hector J Robinson Observatory, June 28, 2010

One FAAC members blog

<http://hjrobservatory.blogspot.com/>

A few updates on the observatory, quick articles and photos. I'll try to improve my writing on this blog. Also, I try to keep daily updates on this blog. - Greg Knekleian, HJRO volunteer.

FAAC Equip Report 1/11/15

By Dennis Salliotte

| <u>Presentation Tools</u> | | |
|-------------------------------------------|------------------|---------|
| Projector | Jim Frisbie | 1/6/15 |
| Projection Screen 8' | Bob MacFarland | 1/11/15 |
| Speaker System w/wireless mic | Bob MacFarland | 1/11/15 |
| Bullhorn | George Korody | 1/18/14 |
| DVD Player | Jim Frisbie | 1/6/15 |
| Projection Screen 6' | Gordon Hansen | 1/6/15 |
| Projector, ViewSonic | Gordon Hansen | 1/6/15 |
| <u>Demonstration Tools</u> | | |
| Weight On Planets Scale | George Korody | 1/18/14 |
| Lunar Phase Kit | Bob MacFarland | 1/11/15 |
| 100 ft Scale Model Solar System Kit | Bob MacFarland | 1/11/15 |
| <u>Display Items</u> | | |
| Astronomy Event Sign (3' X 6') | Gordon Hansen | 1/6/15 |
| PVC Display Board - Folding | Tim Campbell | 6/5/14 |
| Banner – Large (32" X 16") | Dennis Salliotte | 1/11/15 |
| Banner – Medium (24" X 72") | George Korody | 9/27/14 |
| Banner – Small (24" X 32") | George Korody | 3/15/14 |
| Tri-Fold Presentation Boards | Don Klaser | 1/23/14 |
| Tri-Fold Poster Board (Early Club Photos) | George Korody | 1/18/14 |
| <u>Other</u> | | |
| TA Sky Quality Meter | Syed Saifullah | |
| EPK1 Eyepieces, filters & accessories | Liam Finn | |
| TA Sky Atlas 2000.0 | Tim Dey | 1/11/15 |
| TA Orion telescope binoviewer | Liam Finn | |
| Canopy (10' X 10') | Tim Campbell | 8/10/14 |
| Equipment Etching Tool | Gordon Hansen | 1/6/15 |
| Pop Cooler | Michael Dolsen | 12/4/14 |
| <u>Lincoln Park Observatory</u> | | |
| LPO Celestron binoviewer #93691 | Tim Dey | 1/11/15 |
| LPO Celestron 2X 1.25" Barlow | Tim Dey | 1/11/15 |

FAAC Equip Report 1/11/15

By Dennis Salliotte

| Imaging SIG | | |
|---------------------------------------------------------------------------------|---------------|---------|
| C1-C5 5ea camera kits | Gordon Hansen | |
| CA 5ea misc imaging accessories | Gordon Hansen | |
| CA1 Rigel Systems Spectroscope | Gordon Hansen | |
| | | |
| Special Event Use Only- Not Available For Loan Out | | |
| TK1 Coronado PST solar scope w/double stack, Meade Autostar Goto mount & tripod | John McGill | |
| TK2 Meade 8" ETX-LS-ACF w/tripod, voice assist & GPS | Tim Dey | 1/11/15 |
| BK1 Orion BT-100 binocular telescope, VersaGo h.d. man altaz mount | Ken Anderson | 1/11/15 |
| BK2 Zhumell 25x100 binoculars & Zhumell TRH-16 tripod | Sandra Macika | |
| TAK1 Night Vision Intensification binocular unit | George Korody | |

Ford Amateur Astronomy Club
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