

# Rappahannock Astronomy Club

## Minutes, September 12, 2012, Meeting

In attendance:

- Bart & Linda Billard
- David Buckwalter
- George Clarke
- Joe & Sherry Francis
- Leigh Gettier
- Glenn Holliday
- Mary-Katy Hancock
- Jerry Hubbell
- Amber Hubbell
- Dan Lien
- David Marlow
- Tim Plunkett
- Rana Strickland\*

\*Joined at the meeting

President Jerry Hubbell began the meeting at 7:00 p.m. after introductions. Thirteen members and 1 visitor were present, along with a visitor who came to join at the meeting.

## Program

Joe Francis presented "Supernovae," telling us about stars that explode, some of which can be seen in the most distant galaxies. In fact, they rival or outshine their galaxies for short periods (weeks to months). Supernovae (or supernovas) include types Ia, Ib, Ic, and II, and also hypernovae, but not novae, which are not as bright. A nova occurs when a white dwarf with a companion star builds up hydrogen from the companion. The buildup reaches a temperature where it flares up in a fusion reaction and causes the binary system to temporarily brighten before dimming and beginning the buildup process again, allowing novae to recur. Supernovae and hypernovae mark the death of the star. Types I and II are distinguished by the absence (type I) or presence of broad hydrogen lines in the spectra. The type I subclasses are distinguished from each other by strong ionized silicon (type Ia), helium with weak or no silicon (type Ib), or both helium and silicon weak or absent (type Ic). A stellar explosion brighter than ordinary supernovae is called a hypernova. These are 20 times as bright as type Ia supernovae and usually involve a gamma-ray burst.

Type Ia supernovae are distinct from the other types because they are believed to be the explosion of an entire white dwarf. These explosions result after accretion of material from a binary companion as occurs with novae, but depend on the white dwarf being near a mass limit. They have been found to have a reliably predictable brightness. This regularity allows type Ia supernovae to be used as "standard candles." Astronomers can find their distance by observing how bright they appear and knowing how bright they actually are. They give astronomers a way of measuring great distances all the way out to some of the most distant galaxies.

White dwarfs form from stars similar in mass to our Sun that have exhausted their fusion fuel. (The Sun lacks a binary companion star necessary for it to end one day as a type Ia supernova.) Stars that become type II supernovae have significantly more mass than the Sun, and such stars do not become white dwarfs. These stars use up their hydrogen cores much more rapidly and then start fusing helium in the core along with more hydrogen just outside the core. Eventually they develop layers of successive fusion products, with the most recent fusing in the core, the one before in the next layer out, and hydrogen fusing in the outermost layer of the star's interior. (For example, inside the hydrogen layer is a helium layer, then a carbon layer, and so on.) A crisis occurs late in the massive star's life if it reaches a point where iron builds up in the core. It takes energy for a star to make elements more massive than iron, so the fusion process in the core can no longer maintain the high temperature needed to balance gravity. The end is a sudden collapse of the core that produces the supernova. The result is a shock wave that blows off the outer part of the star and leaves, depending on the star's mass, a neutron star, black hole, or possibly complete destruction. The energy released accounts for the production of all the elements more massive than iron.

Joe described some of the supernovae that have been identified in historical accounts. The first documented case, in Chinese accounts, dates to 185 AD and is believed to be the source of the supernova remnant SN185, also called RCW 86. He said an event recorded in 774 AD in Britain may have been another supernova. A recent 1979 supernova, SN1979c, resulted in what is currently considered the youngest known black hole.

## Old Business

- Treasurer's Report—Tim was not at the picnic and said that the lack of incoming dues payment might not reflect any collected then. Paid membership for 2012 remains at 37 with that proviso.
- Star Parties, Events, and Meetings—All the recent star parties were washed out by weather. The Club picnic, however, was a success (although some rain fell).
- Status of Club Loaner Equipment—Glenn reported no new check-outs or returns. A Meade 60-mm refractor donation was received recently. The donor wished to have it available for use by younger members. It has go-to capability and two eyepieces. There is some damage to the tripod. Ben Ashley volunteered to try to check it out and report on any work it needs. Jerry brought the Personal Solar Telescope to the meeting, and Tim Plunkett asked to check it out. Don said Mike Masters had returned the Comet Catcher to him.
- Star Party and Outreach Requests—We did not have word about the events Myron had planned for the Stafford Libraries. Dave Buckwalter said he had planned to support the Bealeton event, but did not go because the weather was marginal. October 6 is scheduled for Stratford Hall, and November 10 is scheduled for Northumberland. Ben Ashley and Bart and Linda Billard indicated they might be able to support the latter. October 20 has two events: a concert featuring *The Planets* at UMW and the Lake Anna outreach. Jerry listed the members planning to support the concert and asked for volunteers for Lake Anna. Leigh Gettier and Ben Ashley said they could support Lake Anna. Joe Francis expressed an interest, but was uncertain about whether the distance from King George would be too much for him. Glenn reported that his inquiry about making up the washed-out primary star party on the Saturday following the meeting was welcomed by his Caledon contacts. Leigh Gettier and Bart and Linda indicated their desire to go. Jerry agreed to make the weather call on Saturday when Glenn said he had a conflict.
- University of Mary Washington (UMW) Philharmonic Outreach—Jerry briefly discussed plans for this event. He is going to talk about what was known about the planets at the time Holst composed the work compared with what is now known.
- RAClub.org Website and Rac\_group Status—Jerry discussed the need for someone to maintain the raclub.org website. Glenn and Jerry have been sharing the task since mid-July. David Buckwalter said he does that kind of work but would not be available before spring because of other commitments. Don Clark said he might have time to help with fixing a problem here and there. Scott Busby was not present to report on rac\_group status.
- Club Newsletter—Jerry said the newsletter had been emailed to the membership. Any members who did not receive it should let him know what email address should be used so that he can update the mailing list. A few copies have been printed for use as handouts. Linda Billard said she had started planning the next issue and asked for ideas for articles.

## News/New Business

- Upcoming election of officers for next year—Jerry noted nominations for Officers are due next month in preparation for the November meeting elections. Glenn Holliday needs to reduce his commitments and does not wish to run for Vice President. Jerry said the other officers are willing to run again, but he is looking for one or two volunteers to run for Vice President.
- New business solicited from the floor—Glenn said it is time to work on the star party and outreach schedule for next year. He was seeking feedback on whether members are comfortable with the level and distance range of the outreach schedule we had this year. Dave Buckwalter asked about coordinating some events with NOVAC. It was noted that had happened in the past at times when we were going to Big Meadows. Joe's membership in NOVAC might offer a way to explore the possibility again.

## **Next Meeting**

The next meeting is on Wednesday, October 10, 2012, at the Central Rappahannock Regional Library Headquarters, 1201 Caroline St., in Fredericksburg. Introductions will begin at 6:45 p.m.