Novas and Planetary Nebulas

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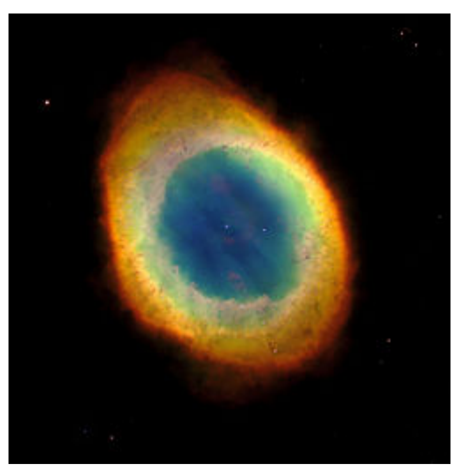
Abstract

Novas are the astronomical "little sisters" of many supernovas. Whereas supernovas get most of the splashy media, numerous smaller nova eruptions contribute in their own way to the evolution of our Milky Way. Our home star will become a planetary nebula as its last act, but not soon. Two essays are featured, with cosmological and religious findings.

Anybody who telescopically visits the **supernova remnant** Crab Nebula (M1) and the **planetary remnant** Ring Nebula (M57), both Messier objects of great beauty, will easily see that these two "nebulas" have different origins.



This essay will examine some of their differences from a visual observer perspective. Our brief journey herein will revisit two nova essays written by this author, each of which has added to the body of knowledge. Data reported earlier has been enriched by more recent data, such as spectral lines that display additional elements created by different types of exploding stars.

Very briefly, a **supernova explosion** is mighty, and can be seen rarely within the Milky Way, and in greater numbers within the population of distant galaxies. **Novas** are more frequent explosions on a much smaller scale. There are commonalities involving what usually happens before each explosion.

Planetary nebulas (such as the Dumbbell, the Eskimo, and the Helix) happen when an ordinary star like our own runs out of fissionable hydrogen to fuse into helium. Eventually, the stellar core furnace’s outward pressure is no longer enough to prevent inward gravitational pressure. The star compresses radically, releasing a shell of gas which creates the visible nebula. What’s left is a dense white dwarf star with nearly the mass of its original star, and a final diameter similar to Earth’s. A tracking telescope such as my 16” Dobsonian at 250x, reveals the Ring’s residual white dwarf on a night with steady skies.

Ordinary stellar novas form between dual-stars in a way similar to how Type 1a supernovas form. Planetary nebulas form more like Type II stellar supernovas. The key difference is that more common nova events typically involve a red giant paired with a sufficiently close white dwarf orbital companion. The same paired dynamics apply to Type 1a supernovas – but not to Type II where a collapsing stellar mass of more than ten suns alone is sufficient. More information regarding the cycles of **repeating novas** is found in my Star of Bethlehem essay, in the second hyperlink on the same typic. Here too for supernovas is a concise essay explaining this difference.

Novas can occur among paired stars with 0.8 to maybe 8 solar masses, but yield no black hole. When singular giant stars of more than ten solar masses collapse the result is much more dense than a white dwarf. Supernovas may create very dense exotic stars, and some very massive implosions even leave a stellar black-hole central mass. The Crab Nebula (seen on the first page of this essay on the left), has a remnant radio **pulsar**, a type of rotating neutron star. [Female postgraduate doctoral astronomer, Jocelyn Bell, in 1967 first made this great discovery; but her male advisor got the Nobel in 1974. She got nothing.]

Much larger stars are more likely to collapse below detectable remnants such as pulsating **neutron stars**, and continue to compress into a black-hole central mass. Outside that mass is a virtual gravity sphere called its **event horizon**, within which visible-spectrum photons can enter but not leave, except very slowly by quantum radiation. Interestingly, at the very shortest photon frequencies "black holes" are brilliant, but for now undetectable.

There is another type of black hole that inhabits most large galaxies: the **supermassive black hole**. Their black hole event horizons are much larger, typically containing at least several million solar masses. Our Milky Way has a supermassive black hole of a few million solar masses, in addition to numerous stellar-mass black holes. The great elliptical galaxy, M87 in Virgo where the first BH image was captured, has a central black hole visual void with over one billion solar masses. If you want to learn more about supermassive black holes inside our local visible universe, and in the multiverse, click on this blue hyperlink.

Two Nova Essays with Novel Discoveries

Over the years I have written several essays mentioning novas and planetaries. These viewable objects are a fascination of mine, partly because large "light buckets" are good at revealing to the visual observer abundant blue and green frequencies, even though the "rods" in our retinas visually see their dim colors as shades of gray. There are more photon frequencies associated with both nova and supernova nebulas, commonly toward the infrared side of the spectrum beyond what the naked human eye can see. Reds and similar long photonic waves show better in amateur and professional CCD astrophotography.

I am by preference a field observer who prefers real time visual encounters, not enhanced computer images. Thanks to today's dual availability of visual telescopes and published CCD images, we amateur star lovers can have it both ways.

Here below I re-introduce readers to two investigations already inside my astronomy-links.net collection. Simply visit the blue hyperlinks, and URL addresses within, to learn more about each essay's nebula subject matter:

The Mystery of Arp's Loop

In the 1960s professional astronomer Halton Arp noticed a mysterious curved line over the disk of an impressive spiral galaxy, M81. This "island universe" and its nearby neighbor M82 are favorites of backyard astronomers. It takes a large tracking telescope and excellent atmospheric stability to yield enough resolution to visually see Arp's curved dark line, or loop segment.

In 2010 two groups of professional astronomers at two universities, six experts in all, seriously examined this unusual phenomenon, and properly concluded that Arp's Loop is not the product of M82's tidal gravity. It is a line-of-sight phenomenon from within the dusty Integrated Flux Nebula (IFN) region above and below our own galaxy's disk. All six astrophysicists thereby became "sky fishermen" who caught the small-fish phenomenon, but never caught the big fish.

About this time I independently became curious about Arp's Loop, and had never heard of their most recent paper. It took me about five minutes to achieve their Milky-Way dust conclusion. However, my independent dust-ring conclusion embraced both their astronomical "small fish" – and the "big fish" they ignored.

The small fish was their line-of-sight explanation. The big fish was realizing that this mystery is not mysterious. There are many loops, or smoke-ring-like floating circles, inside the Milky Way's galactic halo. These twisted ghostly loops appear to have similar size, and they are scattered within the great IFN layers above and below the Milky Way's planes. The key finding is that such dusty rings are not virtually impossible objects appearing within any diffuse gas clouds. They somewhat look like floating smoke rings human cigar smokers like to exhale. The galactic rings are previously undocumented **nova explosion remnants**. This major IFN nova discovery, of course, has been ignored by the professional astronomical community.

Here is the clickable link to my original Arp's Loop essay, with two key images. Here too is a bonus image link that shows a separate nova remnant "smoke loop" visually just above Polaris at the one o'clock position. The faint streak that seems to enter the "Polaris nova remnant loop" is just a random tiny meteor.

The Star of Bethlehem Identified

The most exotic Biblical sky object is the Star of Bethlehem. There has long been a mystery surrounding where and when it appeared, if at all. My research has identified the most likely candidate object, and it is a repeating nova. I conclude that the Biblical Star was possibly real, and this celestial flash could have guided the three wise astrologers who followed it to Bethlehem.

I have earlier written two essays on the Star of Bethlehem, which also reveal what its remnant looks like two thousand years later. Today's general discussion has covered how some nova explosions are repeated after the companion white dwarf periodically sucks off enough gas from its larger neighbor for another flare-up. This repeat mechanism is how we know that the famous Star of Bethlehem is a periodic nova remnant – not a one-time planetary, or completely novel sky appearance. Of course, both of these essays have also been ignored.