



## **Happy 100th Anniversary: First Liquid-Fueled Rocket Launch**

*by Robin Byrne*

This month we celebrate a milestone in the development of rocketry. Robert Goddard's interest in science started early, ultimately leading to a PhD in physics in 1911. It was during graduate school that he began thinking about rocketry and the use of liquid fuels. His dream was to find a way to explore the upper atmosphere, and beyond, with rockets. In 1914, while working as a research fellow at Princeton University's Palmer Physical Laboratory, Goddard filed for his first two patents. One was for a multi-stage rocket, and the other was for a rocket that could be fueled by either liquid or solid fuel.

Goddard paid for most of his early experiments himself, but in 1917 that changed when the Smithsonian Institution awarded him a grant of \$5000 per year for five years. In 1920 the Smithsonian published one of Goddard's articles,

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## About BSAS

Organized in 1928, the Barnard-Seyfert Astronomical Society is an association of amateur and professional astronomers who have joined to share our knowledge and our love of the sky.

BSAS meets on the third Wednesday of each month at the Warner Park Nature Center in Brentwood. Experienced members or guest speakers talk about some aspect of astronomy or observing. Subjects range from how the universe first formed to how to build your own telescope. The meetings are informal and time is allotted for coffee and hanging out. You do not have to be a member to attend the meetings.

Membership entitles you to subscriptions to *Astronomy and Sky & Telescope* at reduced rates; the club's newsletter, the *Eclipse*, is sent to members monthly. BSAS members also receive membership in the Astronomical League, receiving their quarterly newsletter, the *Reflector*, discounts on all astronomical books, and many other benefits.

In addition to the meetings, BSAS also sponsors many public events, such as star parties and Astronomy Day; we go into the schools on occasion to hold star parties for the children and their parents. Often the public star parties are centered on a special astronomical event, such as a lunar eclipse or a planetary opposition.

Most information about BSAS and our activities may be found at [bsasnashville.com](http://bsasnashville.com). If you need more information, write to us at [info@bsasnashville.com](mailto:info@bsasnashville.com).

## Free Telescope Loans!

Did someone say free telescopes to borrow? Yes, you did read that correctly. The BSAS Equipment & Facilities Committee has telescopes ranging in size from 2.6" to 8" that current members can actually have to use for up to 60 days at a time. We also have some other items in the loaner program such as a photometer, H-alpha solar telescope, educational CDs, tapes, DVDs, and books. Some restrictions apply. A waiting list is applicable in some cases. The BSAS Equipment Committee will not be held responsible for lost sleep or other problems arising from use of this excellent astronomy gear. For information on what equipment is currently available, contact [info@bsasnashville.com](mailto:info@bsasnashville.com).

## President's Corner

by Steve Hughes

Greetings, Astromeisters!

Alright, who's been buying all the new astro gear over the last few months?... Can you believe we have not had an official BSAS star party since last September?? I mean, Nashville may not be the clear sky capital of the country, but this is nuts! I say we all vow to not buy any new gear for the next six months... Who's with me?...

Speaking of disappointment, we tried twice in January for our first joint-venture **BSAS / Dyer Star Party**, and got weathered-out both times! But, alas we will **NOT** be defeated!! So we're trying again for **Saturday, February 28th at Shelby Bottoms Nature Center!** This is slated to be our biggest start party ever (if the weather cooperates) so come join the astro-festivities! Bring a scope if you can to share with the masses!

BSAS welcomes members of every skill level - from total newcomers to seasoned pros! With many members still finding their footing in astronomy and astrophotography, we'll be ramping up some of our our beginner-friendly content... 101 guides, workshops, table chats, along with deeper dives into more advanced topics. We're a "full-spectrum" astronomy club! :-)

Ever heard of the Pareto Principle?... Yeah, me neither... But I have heard, that in groups like ours, often 20% do 80% of the work... We don't want to be one of those lame 80/20 groups, do we?...

Come join the "dark side" - help BSAS behind the scenes! **No experience required!** A lot goes on to keep BSAS running smooth that most people don't see... Booking speakers, hauling gear, meeting setup, star parties, wrangling parks, running the website, newsletter, mail lists, weather watch, UFO lookout, pyrotechnics...

If you'd like to help us out we'd love to hear from you! (Specifically we could really use some help with the monthly meetings setup!) Just shoot us an email at [info@bsasnashville.com](mailto:info@bsasnashville.com)!

If you only knew the **power**, of the **volunteer**!!...

Be safe, be kind, and keep looking up!

Steve Hughes  
President, BSAS

*"Every star may be a sun to someone." - Carl Sagan*

### The BSAS 2026 Member Wall Calendar has LANDED!!

The BSAS 2026 Member Wall Calendar is HERE!!! VERY special thanks to all the BSAS members who shared some of their amazing images to make this project possible!! We still have a few in stock, available at any event or on the BSAS website. Calendars are \$20 for members, \$25 for non-members. Click or Copy and paste the link below for a preview.

<https://photos.app.goo.gl/gU2dxM3iM5vEpqcW6>

## Upcoming Events & Activities

### *March Member Meeting*

Since our February meeting was canceled, our next member meeting will be March 18th, at the Warner Park Nature Center!

- **Wednesday, March 18**
- **7:00 - 9:00p.m. (ish)**
- **7311 Tennessee Highway 100**
- **Nashville, TN 37221**

### **This month: Lost Plates of Edward Barnard!**

Last year, hidden deep in the dusty archives of the Sudekum Planetarium, a priceless treasure was discovered: A collection of original photographic plates by one of BSAS's namesakes, E.E. Barnard! Join us as Drew Gilmore, head of the Sudekum Planetarium at the Adventure Science Center here in Nashville, shares what they've learned about this unique find!

### *Joint BSAS / Dyer Observatory Star Party!*

Join us **Saturday, Feb. 28**, as **BSAS** and the **Dyer Observatory** join forces to host one of the **biggest Nashville Star Parties of the year!!** See and experience expert-guided telescope views of amazing winter gems like the Moon, Jupiter, Saturn, Orion Nebula, Pleiades, Andromeda Galaxy, and more!!

**\*\*\* This is a weather dependent event! Please check here for last minute info!! \*\*\***

**Everyone is welcome! Kids and adults alike!** There will be several telescopes set up for visitors to look through and check out. If you have a telescope you are welcome to bring it, but you don't have to. Just bring your curiosity and enthusiasm for space and astronomy!

Vendors will also be on hand to fuel the astro festivities!!

**YOU DO NOT NEED TO REGISTER WITH DYER!! This is a public event, open to all! Join us!**

### **Missing Minutes?**

*Regular- and Board-Meeting minutes are stored on the BSAS Google Drive, and available for review once posted.*

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titled *A Method of Reaching Extreme Altitudes*. While mostly a mathematical treatment of how rockets could function in space, it also included a proposal to impact the dark side of the Moon with a rocket equipped with flash powder, so that the impact could be observed from Earth. While the scientific community paid little to no attention to this article, the press picked up on its more sensational aspects, blowing them out of proportion. A January, 1920 editorial in the *New York Times* scoffed at his ideas, stating that a rocket wouldn't work in the vacuum of space since there would be no air to push against. Meanwhile, the ideas appealed to others who quickly volunteered to fly on one of his Moon-bound rockets.

Because of the publicity this article created, Goddard became wary of sharing his ideas with the public. While still willing to discuss his work in broad, vague terms, he no longer wished to publish any details. Adding to this reluctance was a paranoia that others would steal his ideas, convinced that no one else would independently think of such things. That concern only grew when rocketry clubs started to become popular in Germany during the 1920's.

It was in September of 1921 that Goddard first began experiments with liquid-fueled rockets. Using a mixture of gasoline and liquid oxygen, his tests allowed him to refine his engine design. It took over four years, but he finally found a combination that looked like it would work.

On a farm in Auburn, Massachusetts, Goddard set up his, relatively small, rocket. Coming in at about 10 feet tall, and weighing only 10 pounds when fully fueled, the rocket, dubbed "Nell," was launched on March 16, 1926. The rocket was designed with the engine on top and the fuel in tanks below, with the thought that this configuration would have greater stability. Only after the gasoline and liquid oxygen had burned for 20 seconds did Nell begin to rise. In the next 2.5 seconds, it rose to a maximum height of 41 feet and landed 184 feet away, where it broke apart upon impact. The only people present to witness this historic event were Goddard, his wife Esther, and two of his assistants from the university. Goddard didn't even publicize what had occurred, only telling a few people within the next few weeks. This monumental achievement was his secret for over a decade.

Goddard continued to work on his rocket designs. He found that placing the engine below the fuel was sufficiently stable and made the design simpler. As his rockets flew on longer and more distant flights, he realized that additional measures were needed for stability, such as adding moveable vanes to the engines to adjust the direction of the exhaust, and gyroscopes to control the direction the rocket points during its flight.

In 1930, Charles Lindbergh convinced the Guggenheim family to provide funding for Goddard's continued efforts. With their support, Goddard moved to Roswell, New Mexico and built a larger facility for his research. Ultimately, his

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**Become a Member of BSAS! Visit [bsasnashville.com](http://bsasnashville.com) to join online.**

**All memberships have a vote in BSAS elections and other membership votes. Also included are subscriptions to the BSAS and Astronomical League newsletters.**

**Annual dues:**

- Regular: \$25
- Family: \$35
- Senior/Senior Family: \$20
- Student:\* \$15



**\* To qualify as a student, you must be enrolled full time in an accredited institution or home schooled.**

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most successful rocket reached an altitude of 9000 feet - far below his goal of reaching space. In 1936, under pressure from the Smithsonian, Guggenheim, and Lindbergh, Goddard published a paper detailing his rocketry development. It was in this report that his initial launch in 1926 was finally made public.

With no interest from the U.S. government, and insufficient support from the Guggenheim Foundation, Goddard was unable to achieve as much as he could have. Meanwhile, other nations were paying attention. In particular, Germany's Werner von Braun took Goddard's beginnings and turned it into the V-2 rocket. For the rest of his life, Goddard was convinced that the German's stole his designs, and he gave von Braun no credit for the development of the V-2.

Robert Goddard died on August 10, 1945, having never witnessed a rocket reaching space. In 1963, Werner von Braun, now working for NASA, said of Goddard, "His rockets ... may have been rather crude by present-day standards, but they blazed the trail and incorporated many features used in our most modern rockets and space vehicles." And it was von Braun's Saturn V rocket that allowed the first men to walk on the Moon. The day after Apollo 11 launched, the New York Times published a retraction of their earlier dismissal of Goddard's ideas, concluding with, "Further investigation and experimentation have confirmed the findings of Isaac Newton in the 17th Century, and it is now definitely established that a rocket can function in a vacuum as well as in an atmosphere. The Times regrets the error."

With the Artemis missions to the Moon coming, hopefully, soon, we can look back 100 years to this small beginning and marvel at the legacy of Robert Goddard and the first launch of a liquid fueled rocket.

References:

*95 Years Ago: Goddard's First Liquid-Fueled Rocket* by John Uri, March 17, 2021

<https://www.nasa.gov/history/95-years-ago-goddards-first-liquid-fueled-rocket/>

*Robert Goddard and the First Liquid-Propellant Rocket* By Michael Neufeld, Mar 16, 2016

<https://airandspace.si.edu/stories/editorial/robert-goddard-and-first-liquid-propellant-rocket>

Cover Photo: *Courtesy of the National Air & Space Museum*

### **Call for Volunteers!!**

BSAS is a non-profit, 100% volunteer operated organization. Please consider giving us a hand if you can!

Specifically, we could use some help with the following:

- > Monthly Meeting Setup: Help set up the space and tech for the meetings.
- > Program Committee: Help research content for our monthly meetings.
- > Event Crew: Help with setting up our various events.
- > Newsletter: Help write and curate *The Eclipse* newsletter

If you have an interest in helping with any of the above, or in any other way, please email us at [info@bsasnashville.com](mailto:info@bsasnashville.com).



In honor of the club's 90th anniversary we partnered with Hatch Show Print to create a unique poster that would honor the achievement of the club. For those who don't know Hatch Show has been making posters for a variety of events and concerts for 140 years. In all that time we are their first astronomy club.

On the poster at the center is the moon. This was made from a wood grained stencil that the shop has used for over 50 years. To contrast that the telescope that the people are using is a brand new stencil made for our poster.

The poster has three colors. First the pale yellow color of the moon was applied. Next the small stars, circles, and figures at the bottom were colored in metallic gold. The third color is a blue for the night sky.

Where it overlaps with the metallic gold it creates a darker blue leaving the figures at the bottom looking like silhouettes.

This was a one-time printing so the 100 that we have are all that will be printed.

The prints are approximately 13 3/4" x 22 1/4" and are available for \$20 at our membership meetings, or \$25 with shipping by ordering through [bsasnashville.com](http://bsasnashville.com). Frame not included.



**Next BSAS meeting**  
**Wednesday, March 18, 7:00 p.m.**

Warner Park Nature Center  
7311 Tennessee Highway 100  
Nashville, TN 37221