AU AstroNews

The Newsletter of the Astronomical Unit

December 2024 **Sponsored by the Santa Barbara Museum of Natural History**

Ronnie, Diane, and David greet visitors at a Second Saturday Viewing. Photo: Tom Totton

Outreach Summary

Since the last newsletter, certified SBAU/SBMNH volunteers Brandy Ackerman, Andy Allen, Tim Crawford, Joe Doyle, David Feinberg, Rosina Garcia & Quasars, Morgan & Brian Green, Ronnie Herron, Sean Kelly, Tessa Flanagan, David Larson, Mike Lawson, Pat & Chuck McPartlin, Edgar Ocampo, Javier Rivera, Tom Totton, Chuck Watson, Diane Welcenbach, Tom Whittemore, Pat Forgey & Jerry Wilson, and Andre Yew showed the sky to ***1268*** guests. Jen Ito & Students, Mae Wilson, and Hovik Yekiazarian also helped out.

Outreach Events

SBAU volunteers must have undergone the SBMNH background check, and conform with the SBMNH policies for dealing with the public, to participate in outreach activities. To get vetted, contact SBMNH Volunteer Manager Rebecca Coulter <rcoulter@sbnature2.org>. It's quick and painless.

Thursday, December 5, setup 4:30 PM
Telescopes for an Astronomy Night at Aliso School, 4545 Carpinteria Ave in Carpinteria. We set up on the blacktop in back of the school.

Friday, December 6, 7 PM
Quick planetarium show, then at 7:30, our monthly meeting in Fleischmann Auditorium at SBMNH. This will be a hybrid meeting, also on Zoom. Watch your email or find the link on the SBAU web page. This meeting will feature our annual election, followed by a Members' Night set of informative and entertaining speakers.

Tuesday, December 10, setup 7 PM
Telescope Tuesday at Camino Real Marketplace, in the plaza by the theater. **For 2025, Telescope Tuesday will shift to the first Tuesday of each month.**

Friday, December 13, 6 PM
SBAU Holiday Party at Timbers Roadhouse in Goleta.

Saturday, December 14, 4:30 PM
AU monthly planning meeting on Zoom. Watch your email for the link.

Saturday, December 14, 5 PM - Peak of Geminid Meteors.

Saturday, December 14, setup 6 PM
Monthly Public Star Party at SBMNH, at Palmer Observatory from 7 to 10 PM.

Friday, December 20, 6 PM
Monthly Public Telescope Night at Westmont, at their Keck Observatory, next to the athletic fields.

Saturday, December 21, 01:21 AM PST - Winter Solstice for the Northern Hemisphere

FROM THE PRESIDENT

Jerry Wilson

We have all heard of the Big Bang theory of the origin of our universe. In that theory and in our modeling of Black Holes we run into the possibility of singularities. Singularities occur in physical theories when the mathematics implies division by zero. An example is a finite amount of mass in a volume defined by a radius of zero. (Division by zero is an undefined operation.) An undefined operation is a messy thing to have in one's theory!

Singularities aren't actually observed. They seem to be implied when we extrapolate theories from regions where we can do measurements to regions where we can't. There may be physics in these nether regions that prevent an actual singularity from occurring.

Currently there are two avenues of attack. One is to try to get experimental measurements of the early big bang, and another is to reconsider the form of the mathematical theory.

We can see back to 380,000 years after the initial hypothetical inflation - and no farther back. But there may be information in the polarization of the Cosmic Microwave Background (CMB) that is consistent with the hypothesized inflation at the beginning of the universe. A new instrument is being built to examine the CMB with greater sensitivity. A team member, Jennifer Ito, now at Westmont College, discussed the project at our public meeting on November 1.

Another approach to address singularities is the "no-boundary proposal" (NBP), which is a theoretical framework in cosmology proposed by James Hartle and Stephen Hawking in the 1980s. It's a model of the early universe, attempting to explain the origins and evolution of the cosmos.

In essence, the NBP suggests that the universe had no boundaries or edges in the beginning, and it has been eternally existing in a self-contained state. This idea challenges traditional concepts of time and space.

The key aspects of the proposal are:

1. No boundary in space-time:
The universe has no edges or boundaries, eliminating the need for boundary conditions.

2. Imaginary time: Hawking and Hartle introduced imaginary time to remove the singularity at the universe's beginning.

3. Quantum gravity:
The proposal unifies general relativity and quantum mechanics, essential for understanding the early universe.

4. Multiverse: The no-boundary proposal implies the existence of a multiverse, where our universe is one of many. The no-boundary proposal has significant implications for our understanding of the universe's origins, but it remains a theoretical framework, subject to ongoing debate and refinement in the fields of cosmology and theoretical physics.

Imaginary time is a mathematical concept where time is treated as a complex number, rather than a real number. This means time is expressed as: $t \rightarrow \tau = it$, where τ is imaginary time, i is the imaginary unit ($i^2 = -1$), and t is real time.

By introducing imaginary time, Hawking and Hartle proposed that (1) spacetime becomes smooth: Imaginary time eliminates the singularity, replacing it with a smooth, curved spacetime. (2) No beginning or end: Imaginary time allows the universe to exist eternally, with no clear beginning or end. (3) Euclidean geometry: Imaginary time transforms spacetime geometry from Lorentzian (real time) to Euclidean (imaginary time), removing singularities.

Keep in mind that imaginary time is a theoretical construct, and its physical interpretation remains a topic of debate among physicists and cosmologists!

DON'T MISS THE SBAU HOLIDAY PARTY!
FRIDAY DECEMBER 13TH AT THE TIMBERS
$40.00 PER PERSON.
RSVP TO EVENTS@SBAU.ORG
PAYMENT DUE BY 12/8/2024

CACHUMA LAKE EVENT

Diane Welcenbach

Cachuma Lake Campout and potluck was held Oct 25th – 27th 2024. It was well attended by SBAU members. The weather was excellent, with warm temperatures, not too many clouds and light wind. The view of the lake with mountains in the background was amazing. There was plenty of room at the campsite for people to spread out and have a nice area to set up their scopes.

The potluck brought lots of great conversations. We all sat at long picnic tables with brown paper table coverings and little yellow pumpkins as decorations. SBAU paid for the main course of tri-tip, chicken, beans, and garlic bread. Members brought delicious appetizers such as cheese, crackers, olives, pickles, side dishes – a variety of green salads, pasta salads, fruit salads and many desserts, pumpkin pie, cherry cheese cake, brownies, chocolate layer cake, cookies and chocolate covered strawberries to name a few.

After the sun went down, the scopes came to life, showing us the beautiful night sky including comet Tsuchinshan-ATLAS. It was quite a spectacular sight to see.

Cachuma Lake donates a campsite to SBAU as a thank you for the outreach outings led by Chuck McPartlin held on the grounds during the year. Thanks to all the super stars that helped make this event a great success.

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SBMNH Astronomy Programs Manager
CURRENTLY VACANT

AU AstroNews, the monthly publication of the **Astronomical Unit (AU)**, is mailed to the AU membership. For publishing consideration for the next month, submit astronomical items by the 20th of the current month!

AU annual membership rate: $20

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DECEMBER 2024						
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
1	**2**	**3**	**4**	**5** ALISO SCHOOL 4:30 PM	**6** SBAU MEETING 7 PM	**7**
8 FQ Moon	**9**	**10** CAMINO REAL MARKETPLACE 7 PM	**11**	**12**	**13** HOLIDAY PARTY 6 PM (AT THE TIMBERS)	**14** ZOOM PLANNING MEETING 4:30 PM STAR PARTY 6 PM
15 FULL MOON	**16**	**17**	**18**	**19**	**20** WESTMONT PUBLIC STAR PARTY 6 PM	**21** WINTER SOLSTICE 01:21 AM PST
22 LQ Moon	**23**	**24**	**25**	**26**	**27**	**28**
29	**30** New Moon	**31**				