

Meeting Minutes 10/18/19

- **ATOMM (Astronomy Tutoring or Majors and Minors):** Need help with math, physics, or astronomy? Want a place to study with friends?

Stop by *EVERYDAY* b/w 2-4pm @ Parker Library, outside N305. Get to know people in your major and work together, while also having upperclassmen available to help!

- **TIMESTEP:** TIMESTEP is a discussion group about topics of professional development for undergraduates in STEM fields at U. Arizona with a specific focus on supporting students who are under represented minorities (URMs). Next Meeting; Applying for Graduate School: An Overview -> on October 23rd in Steward Observatory N305. Hear from faculty about what's involved in applying for graduate school and how to set yourself up to be competitive. Get access to templates to help write your application materials.

- **Searching for Volunteers for Spanish Astronomy Public Talk:**



Searching for Volunteers for the Spanish Astronomy Public Talk on October 21st

- ★ **Help organize** the new talks on astronomy!
- ★ Meet other **Spanish speaking astronomers and physicists!**
- ★ **Gain experience** talking to large groups and in public!
- ★ Talk about future academic careers with our speaker!

Volunteers will...

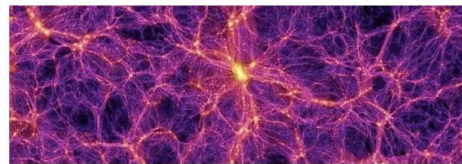
- ... help organize logistics of the event.
- ... greet members of the public before the talk.
- ... translate information from the telescope operators.

Must be a fluent Spanish speaker!

To get involved or for any questions, please email:
rehviding@email.arizona.edu

A History or Dark Matter by Dr. Zaritsky

Date: October 21. **Time:** 7:30 - 9:30 pm.



Buscando Voluntarios para la Charla Pública de Astronomía en Español el 21 de Octubre

- ★ **¡Ayuda a organizar** la nueva serie de charlas sobre astronomía!
- ★ ¡Conoce a otros **astrónomos y físicos hispanohablantes!**
- ★ **¡Adquirir experiencia** hablando con grupos grandes y en público!
- ★ **¡Hablar sobre futuros caminos académicos** con nuestro ponente!

Los voluntarios...

- ... ayudarán a organizar la logística del evento.
- ... saludarán a los miembros del público antes de la charla.
- ... traducirán información de los operadores del telescopio.

Debe haber español con fluidez!

Para participar o para cualquier pregunta, envíe un correo electrónico a:
rehviding@email.arizona.edu

Una Historia de Materia Oscura por el Dr. Zaritsky

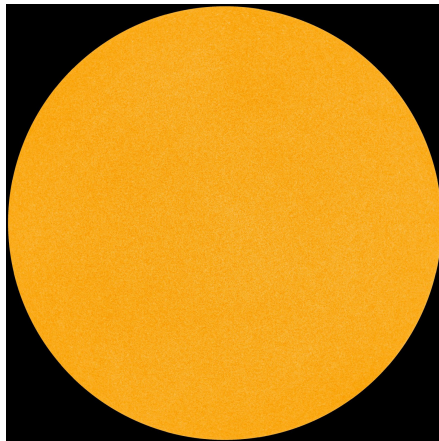
Fecha: 21 de Octubre. **Hora:** 7:30 - 9:30 pm.



- **Astronomy Question of the Week:**
 - The “Sound Barrier” was broken 72 years ago by Chuck Yeager



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- Today's Sun, a record in the making?
- **DEEP SOLAR MINIMUM:** As of today, the sun has been blank (no sunspots) 74% of the time in 2019. This is significant because [the previous record](#) for spotlessness during the Space Age was 73% set in 2008. If low sunspot counts continue apace, 2019 could end up as the deepest Solar Minimum of the Space Age.



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- What's going on in this picture? Timed exposure from a plane, the fuzzy thing in the background is the southern view of the Milky Way! Large streak is a meteor! You can also see its reflection in the wing of the plane! Jupiter is right above the plane wing.
- <https://www.foxnews.com/science/nasa-spots-bright-blue-meteor-jupiter-in-stunni>

ng-images

- “What if Planet 9 is a primordial black hole? (Sept. 24, 2019)

What if Planet 9 is a Primordial Black Hole?

Jakub Scholtz¹ and James Unwin²

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We highlight that the anomalous orbits of Trans-Neptunian Objects (TNOs) and an excess in microlensing events in the 5-year OGLE dataset can be simultaneously explained by a new population of astrophysical bodies with mass several times that of Earth (M_{\oplus}). We take these objects to be primordial black holes (PBHs) and point out the orbits of TNOs would be altered if one of these PBHs was captured by the Solar System, inline with the Planet 9 hypothesis. Capture of a free floating planet is a leading explanation for the origin of Planet 9 and we show that the probability of capturing a PBH instead is comparable. The observational constraints on a PBH in the outer Solar System significantly differ from the case of a new ninth planet. This scenario could be confirmed through annihilation signals from the dark matter microhalo around the PBH.

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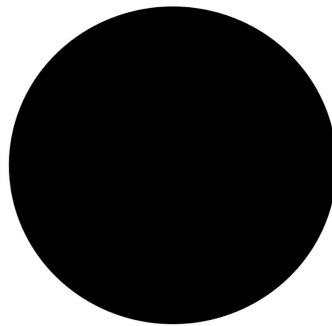
SUPPLEMENTARY MATERIAL

A. SIZE OF THE PBH

The Schwarzschild radius of a black hole is given by

$$r_{\text{BH}} = \frac{2GM_{\text{BH}}}{c^2} \approx 4.5\text{cm} \left(\frac{M_{\text{BH}}}{5M_{\oplus}} \right). \quad (15)$$

In Figure 1 we provide an exact scale image of a $5M_{\oplus}$ PBH. The associated DM halo however extends to the stripping radius $r_{\text{strip}} \sim 8\text{AU}$, this would imply a DM halo which extends roughly the distance from Earth to Saturn (both in real life and relative to the image).

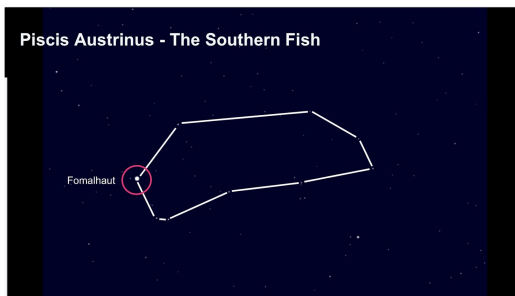


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FIG. 1. Exact scale (1:1) illustration of a $5M_{\oplus}$ PBH. Note that a $10M_{\oplus}$ PBH is roughly the size of a ten pin bowling ball.

- (okay but the paper has this circle to scale of what the size of the black hole could actually look like)
- What are the expected characteristics? How would you detect it?
- You could detect it from gravitational lensing!
- What is a PBH? Moderate mass bh thought to have been created in the early universe
- Event horizon of a $5M_{\oplus}$ PBH, $R_{\text{Sch}} = 2GM/c^2 = 4.5\text{cm}$
- How close could you get to it? Tidal force goes as r^{-3} , $\Delta F = (2GMm/r^3) \Delta r$ so the “human tidal radius” is $\sim 50\text{km}$
- Dark Matter Halo
- Gravitational Lensing -> <http://antwrp.gsfc.nasa.gov/apod/ap951127.html>
- **Astro News of the Week:** Presented by Herblurb! (aka Madison Walder) (aka the person who writes the meeting minutes that only her favorite people read) (aka me) Here’s the link to the articles:
<https://www.washingtonpost.com/technology/2019/10/18/nasa-live-spacewalk-christina-koch-jessica-meir/> First all-woman space walk happened!
- **Pls sign up y’all it’s super chill and fun, the sign up sheet is out! ALSO if you sign up and present, you’ll get a free Astro Club shirt of your choosing**

- **Constellation Corner:** Presented by Sammie Mackie! This week is Piscus Austrinus - The Southern Firsh! Check out the mythology behind it at [https://www.constellation-guide.com/constellation-list/piscus-austrinus-constellati on/](https://www.constellation-guide.com/constellation-list/piscus-austrinus-constellati-on/).




- **Star Parties:** There will be one on October 24th at Lynn-Uriquides. There will be activities and telescopes at Lynn-Uriquides so we will need about 5-6 people for the event. The sign up sheets will be sent out soon.
- **Arizona Theater Company Presents, Silent Sky:** It is a production about Henrietta Leavitt, she helped classify cepheid variables as standard candles. It will be Friday October 25th-Saturday November 9th every night except for on Mondays.



- **Telescope Training/Demos/Movie Night:** This is tonight after the club meeting. We'll watch a movie (poll to be sent out soon) and have pizza! After, we'll have groups to show how to set up/operate our telescopes and go through our

demos/activities. You need to have completed this before volunteering for a star party!

- **Pumpkin Carving:** Will be on October 25th after club meeting. We'll carve pumpkins on the grass outside of Steward Observatory. Sign up sheet will be sent soon!
- **Kitt Peak Star Party:** Will be on October 26th. Plan on meeting about 10 minutes before 4pm in the south steward parking lot (want to be up there by 5:30pm). Dress warm! Snacks will be provided but you'll need to bring other food for yourself.
- **Integral Competition:** Hosted by the Math Cats. Pairs of people will attempt to solve progressively harder integrals. If you can, you advance to the next round. Interested?
- **The Art of Planetary Science:** Swing by, there will be some art from your fellow astro club members!



THE
ART
OF
PLANETARY
SCIENCE

NOV. 15 5PM - 9PM
NOV. 16 1PM - 5PM
NOV. 17 1PM - 5PM

THE UNIVERSITY OF ARIZONA
KUIPER SPACE SCIENCES BUILDING
1629 E UNIVERSITY BLVD., TUCSON, AZ

- **Physics club:** Meets every other Wednesday at 5pm in PAS. Next meeting will be on October 16th.
- **Astronomy Majors Lounge:** We'll be moving back to the old lounge in 208 on Monday :(
- **Astronomers:** If you have a snacc attacc, look no farther than Astronomers! The unofficial Astro Club snack store, new location tbd. It's restocked every week, and open to everyone, including faculty. Honor system payment
- **Please pay your dues!** They are \$10 a semester. They help provide funds for trips, snacks, cool activities, shirts, etc. Also if you want to attend one of our internal events such as the club picnic and the dishwalk, you need to have paid your dues!