AU AstroNews

The Newsletter of the Astronomical Unit

May 2018 ***Sponsored by the Santa Barbara Museum of Natural History***

"Greetings, Earthlings. We come in peace."

THE MAY GENERAL MEETING

Our speaker for the May meeting is fellow SBAU member and SBCC instructor, Sean Kelly. His talk is titled "May the Fourth be With You," concerning magnetic fields around celestial objects.

OUTREACH REPORT

Special thanks to everyone who helped out at Astronomy Day! Thank you, also, to those who have stepped up to have the Live Scan screening that is now a prerequisite for being an official SBAU outreach person and getting outreach credit.

Since the last outreach report, intrepid AU astronomy volunteers Peter Angeloff, Farshad Barman, John Boyd, Tim Crawford, Zak Dafaallah, Joe Doyle, John Edkins, Tessa Flanagan, Don French, Ruben Gutierrez, Art Harris, Baron Ron Herron, Jürgen Hilmer, Moe Imad, Sean Kelly, Chris Larson, Pat & Chuck McPartlin, Janet & Martin Meza, Andriy Moskalyk & his brother, Bonnie & Bruce Murdock, Max Neufeldt, Peggy O'Rork, Javier Rivera, Dianne & Russell Ruiz, Colin Taylor, Tom Totton, Tom Whittemore, Jim Williams, Jerry Wilson, and Harold Yarbrough showed neat stuff in the sky to 1461 people.

MAY OUTREACH EVENTS

Here are the AU events scheduled so far for May. To get the latest information on schedules, or directions, just contact Chuck at 964-8201 or macpuzl@west.net

FRIDAY, MAY 4, 7 PM

Monthly meeting in Farrand Hall at SBMNH. Start with a quick planetarium show, followed by a talk from Sean Kelly of SBCC.

FRIDAY, MAY 11, SETUP 7 PM

Telescopes for the Ritz-Carlton Bacara. We set up on the bluff lawn next to the Angel Oak restaurant.

SATURDAY, MAY 12, 5 PM

AU planning meeting in the classroom next to Javier's office at SBMNH, next to Farrand Hall. All are welcome to help plan the club's activities for the year.

SATURDAY, MAY 12, 7 PM

Monthly Public Star Party at SBMNH, next to the Palmer Observatory.

TUESDAY, MAY 15, SETUP 7 PM

Telescope Tuesday at the Camino Real Marketplace in Goleta. We set up in the central plaza by the theater.

FRIDAY, MAY 18, SETUP 7 PM

Telescopes for the monthly Public Telescope Night at Westmont College, at their observatory next to the baseball field.

SATURDAY, MAY 19, SETUP 7:30 PM

Telescopes for a star party at Los Flores Ranch Park, in Santa Maria at 6245 Dominion Road. Setup entrance (with signs) will be up Dominion a bit north of the main entrance.

THURSDAY, MAY 24 - MONDAY, MAY 28
Annual RTMC Astronomy Expo at Big Bear Lake. Hang out with 1000 or so of your favorite amateur astronomers at 7000 feet.

WEDNESDAY, MAY 30, SETUP 8 PM
Telescopes for first graders from Peabody School camping out at El Capitan Canyon Resort.

THURSDAY, MAY 31, SETUP 4:30 PM
Telescopes for a Science Night at Franklin School, at 1111 East Mason Street in Santa Barbara. We set up on their playground, with entry from Yanonali Street on the west.

Quasi Particles

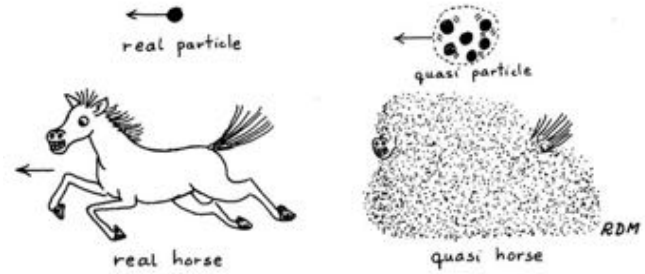
Jerry Wilson

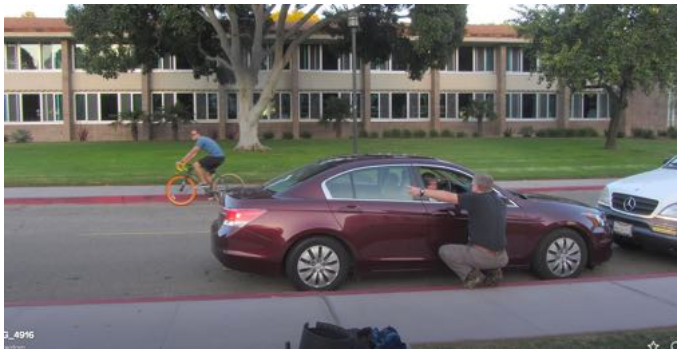
There are particles, virtual particles, and now with April's talk on MKIDs, quasi particles. What are these things? A particle is anything all on its own, so to speak. An example is someone running a marathon, or an electron or proton moving through empty space. They have a mass and charge, and they can be accurately described by plugging that mass and charge into the proper expression to describe their surroundings. They individually obey physical laws such as conservation of energy and momentum; even when they're not on their own. So, we can sometimes treat them as a clump of non-interacting particles. Each one interacts, independent of all the other ones, with its environment as if it were alone.

Conduction electrons in a metal are described by equations that treat only the interaction between one electron and its surrounding atomic lattice times the number of electrons. Direct electron-electron interactions are not treated. Such a mathematical description of electrons is referred to as a Fermi gas theory. Virtual particles are almost particles, so to speak. It's like a toddler who doesn't want to go to bed at night. Every now and then you can catch a glimpse of him in the corner of your eye, but when you look, he's ducked his head back around the corner. Just like the toddler, virtual particles do not obey the rules, such as conservation of energy. If you are fast enough and energy is supplied to them before they disappear, they get promoted to real particles. Virtual particles also appear in pairs such as electrons and positrons. A positron is the anti matter equivalent of an electron. Pair production occurs more commonly in regions of highly curved space-time, such as near the event horizon of a black hole. If the pair pops into existence too near a black hole, then one gets sucked in, so they cannot re-annihilate, and they become real particles, taking energy from the black hole. In this way, black holes can slowly give up their mass and evaporate. This is Hawking radiation.

Quasi particles are real particles with gum on their shoes; like a marathon runner doomed to interact with things around him in order to make progress, including other runners. Suppose everyone is wearing a Velcro jogging outfit. When a quasi electron travels through a metal it is repelled by all other electrons and attracted to each atomic center. This is like when Neo (in the movie "The Matrix") runs down a hall and the walls sag toward him as he passes. For the electron this is making phonons or particles of sound, and it drains the electron's energy, slowing it down. In this case, the electron is a quasi-electron, or a fully dressed electron, and a mathematical model that incorporates these types of extra interactions is called a Fermi liquid theory.

Fermi liquid formulations are necessary to explain the collective behavior of clouds of electrons such as superconductivity, where electrons bind in pairs by exchange of a phonon. An electron races through the atomic lattice as the lattice leans toward the passing electron. The electron zips by, but before the walls can un-distort, they attract a second electron into following the first. The wake of the first negatively-charged electron acts like a positively-charged wave in the crystal on which a second negatively charged electron surfs. The material becomes superconducting when all electrons chain up in this in-phase line of surfers.





"You must have taken a wrong turn somewhere. The Galactic Center is behind you." Photo credit: T. Totton.

"Bruce. Are you sure this is the end I look through?" Photo credit: Tom Totton.

"That's right! Rocky has amazing eyes. And he helps us at the workshop for free!" Photo credit: Tom Totton.

****** The date of the June Potluck may have to be changed from the first Friday – Stay tuned for further updates! ******

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May 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	*2*	*3*	*4* *General Meeting* *7 PM*	*5*
6	*7*	*8*	*9*	*10*	*11* *Ritz-Carlton Bacara* *7PM*	*12* *Planning Meeting 5 PM* *Star Party* *7 PM* *SBMNH*
13	*14* *Tech Talk* *KZSB* *(AM 1290)* *9-10 AM*	*15* *Camino Real Marketplace* *7 PM*	*16*	*17*	*18* *Westmont College* *7PM*	*19* *Los Flores Ranch* *7:30PM*
20	*21*	*22*	*23*	*24* *RTMC*	*25* *RTMC*	*26* *RTMC*
27 *RTMC*	*28* *RTMC* *Tech Talk* *KZSB* *(AM 1290)* *9-10 AM*	*29*	*30* *Peabody at El Cap Cyn Resort* *8PM*	*31* *Franklin School* *4:30PM*		