Focal Point

January, 2014

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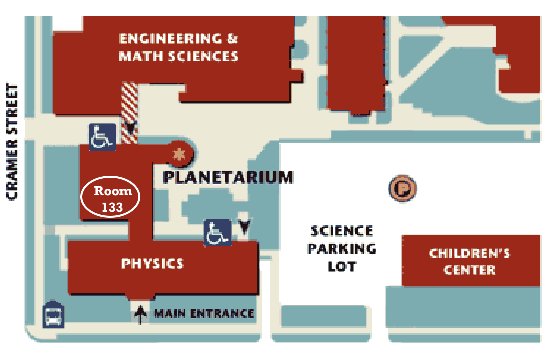
The January Membership Meeting

The upcoming General Membership Meeting of the MAS is going to be held on January 17th, at 8:00PM at the UW Milwaukee Physics Building, Room 133, which is located at 1900 E Kenwood Bld. Parking available in the Science Parking Lot (see the map below). **Lee Keith** will give a talk about **Planetary Imaging**.

With the upgrade of the Z-scope to do narrowband imaging of deep-sky objects, members may not be aware of another class of imaging that also does not depend on dark skies or a large telescope, that of high resolution planetary imaging.

The digital revolution has reached this type of imaging with a vengeance in the past few years with exceptional cameras that are also inexpensive and software that is free! Lee will contrast the bad old days of planetary imaging with the digital imaging of planets and explain the differences with deep sky imaging. He will demonstrate the process of acquiring data and processing it, resulting in an image that shows detail invisible to the naked eye using inexpensive digital cameras from Orion & Celestron as well as software iCap from Celestron and RegiStax 6 from Cor Berrevoets. He will also share some of his images of Saturn and Jupiter.

The MAS Winter Meetings



The winter meetings of the Milwaukee Astronomical Society from January through April will be held at the University of Wisconsin-Milwaukee Physics building located at the corner of Kenwood Boulevard and Cramer Street in Milwaukee. Starting from May the meetings will return to the MAS Observatory in New Berlin.

Christmas Party 2013

This year the MAS hosted its annual Holiday Party on Saturday, December 7th, 2013 at the Observatory. Members and families (23 people) enjoyed pizza-soda-beer-cookies and fellowship with each other.

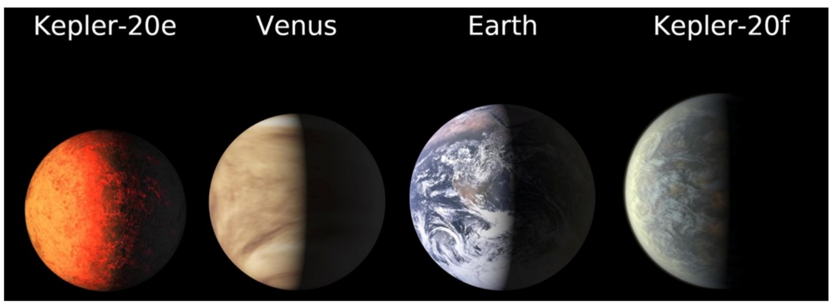
Photos courtesy of Dennis Roscoe.

In the Astronomical News

Planet Formation: More Questions Than Answers

847 and counting: that's the number of planets confirmed as existing around 642 stars within several hundred light-years of our Sun. And more than 2,000 additional detections are awaiting confirmation by follow-up observations. By far, the most potential exoplanets have been found by the NASA spacecraft Kepler (launched in 2009), whose mission is to find Earthlike planets in a habitable zone around other stars, by staring at 150,000 stars and recording minuscule dips in brightness.

So far, Kepler hasn't yet found an identical twin to Earth: a rocky body of similar mass, sweet with liquid water, in the "Goldilocks zone" for temperatures just right for life as we know it to evolve. In fact, Kepler hasn't yet found even an exoplanetary system resembling our Solar System, with rocky planets on the inside, gas giants in the outer reaches, and orbital periods ranging from months to centuries. Instead, most exoplanetary systems are so bizarre they are challenging astronomers and computational astrophysicists to reexamine long-held models of how planets form.



The first Earth-sized planets were found in December 2011 by NASA's Kepler mission around a sun-like star Kepler-20. Kepler-20e is slightly smaller than Venus with a radius 0.87 that of Earth; Kepler-20f is a bit larger than Earth at 1.03 times the radius of Earth. Both are rocky but with scorching temperatures, as their "years" (orbital periods) are only 6.1 and 19.6 days, respectively. Three larger, likely gaseous, planets also circle Kepler-20. Image credit: NASA/Ames/JPL-Caltech

One big early surprise (1995) was the ground-based discovery of "hot Jupiters:" gas giants the size of Jupiter in orbits around their parent stars much closer than Venus—or even Mercury—is to the Sun. How does something that massive form so close to a parent star? Would there have been enough material for such a big body to form in place, without being ripped apart by tidal forces? Or might it accrete from dust and rocks farther out in its planetary system and later migrate inward toward its parent star? Later, lower mass, rocky planets—"super-Earths" only a few times the mass of Earth—were identified from Kepler data.

Meantime, in December 2011, confirmation was announced of two rocky Earth-sized planets in the Kepler-20 system. They are two of five planets orbiting a G-type star a little smaller and cooler than our Sun. But the entire planetary system could almost fit inside the orbit of Mercury; both Earth-sized planets zoom around their star in less than three weeks; the three other planets are slightly smaller than Neptune; and the sequence of planets from star outward neatly alternates large-small-large-small-large.

So what do the observations and calculations tell astrophysicists about how planetary systems form? One key is the relative distribution of mass among planets in a system. Higher mass systems seem consistent with planets assembling in place. That is somewhat unsettling because the mass required for *in situ* formation is a hundred times what we see in our own Solar System. One possibility is that the mass still moved radially inward, but early when it was smaller chunks like gravel, boulders, or asteroids. That still leaves an important question: what processes in a whirling solar nebula allow smaller chunks to stick together to accrete larger objects and eventually planets?

One possibility is very cold temperatures. At 100K, small objects may be covered with water ice, dry ice, and other ices, so when objects collide, they stick together. Another possibility suggested by fluid-dynamics simulations is that turbulence in the collapsing solar nebula causing some fluid wavelike behavior in local areas of the gravitational collapse that triggers a jump from dust to boulders.

by *Trudy E. Bell, M.A.*

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, and Los Alamos National Laboratory). UC-HiPACC fosters collaborations among researchers at the various sites by sponsoring an annual advanced International Summer School on AstroComputing (ISSAC), offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu .

Adopt a Telescope Program - Signup Sheet

	Adoptee	Scope	Location
1	Sue Timlin	18" F/4.5 Obsession	Wiesen Observatory
2	Neil Simmons	12.5" F/7.4 Buckstaff	B Dome
3	Russell Chabot	12.5" F/9 Armfield	A Dome
4	Dan Yanko	10" F/6 Newtonian	Albrecht Observatory
5	Tamas Kriska	25" F/15 Zemlock	Z Dome
6	Henry Gerner	12" LX 200	Tagney Observatory
7	Jeffrey Fillian	14" Z-Two scope	Ray Zit Observatory
8	Vacant	10" LX 200	Jim Toeller Observatory

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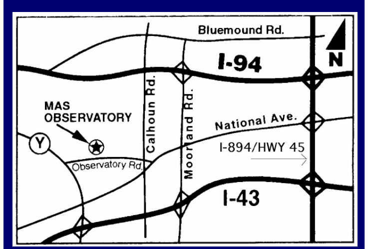
2/8	Jill Roberts	414-597-9422
2/15	Tim Hoff	262-662-2212
2/22	Lee Keith	414-425-2331



MAS Observatory

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New Berlin, WI

www.milwaukeeastro.org