Cosmology/Astrophysics News

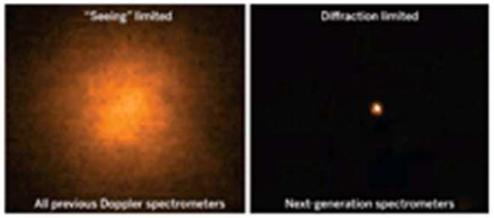
January 21, 2015

for Rose City Astronomers SIG

http://101iq.com/RCA

Science – November 14, 2014

- Improving planet-finding spectrometers
  - http://www.sciencemag.org/content/346/6211/809.figures-only



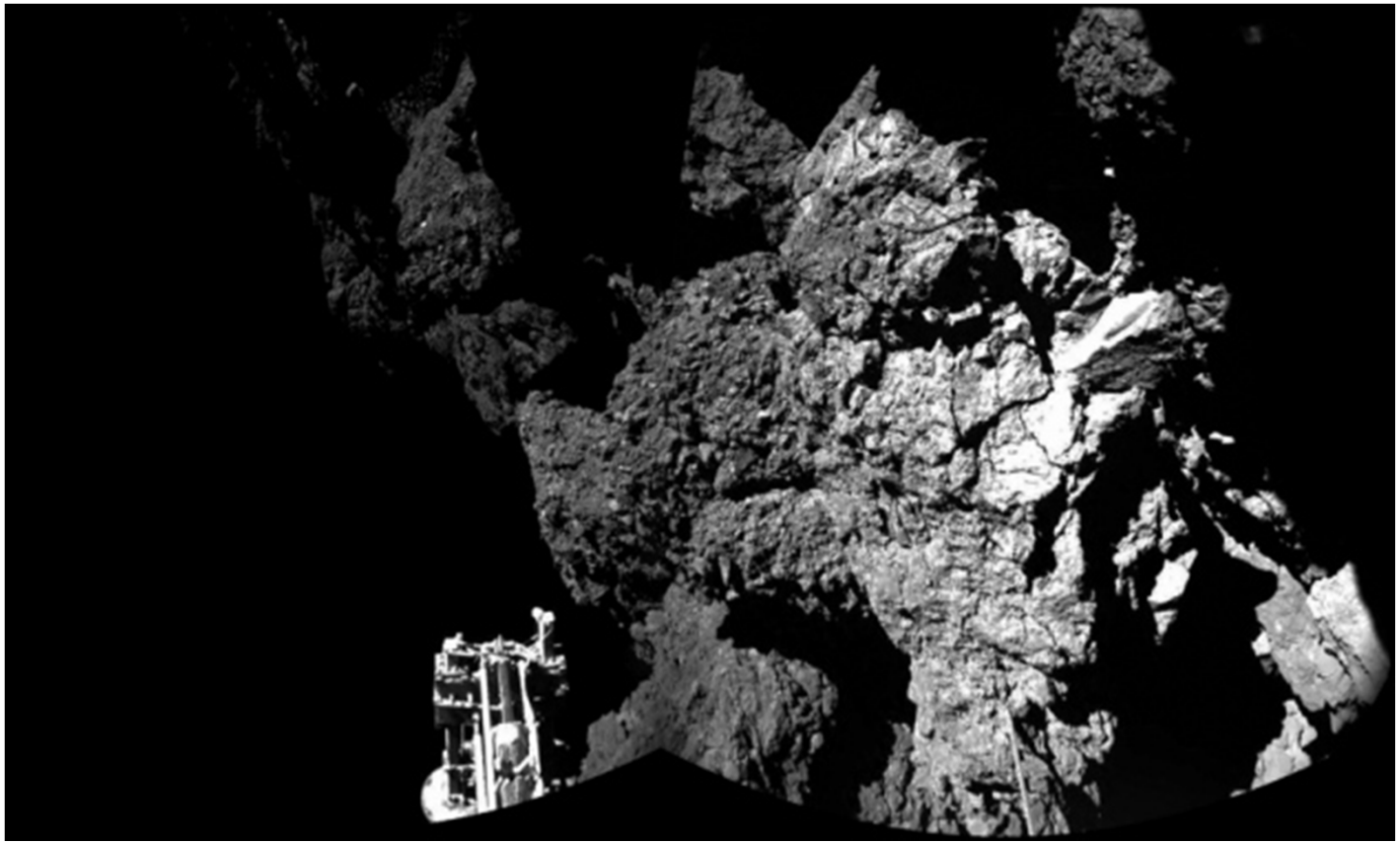
Seeing-limited images versus diffraction-limited images.

An AO-fed spectrometer achieves much higher spatial resolution, and hence spectral resolution, compared to presently available Doppler instruments, owing to fundamental changes in its design. All such design modifications lead to improved velocity precision.

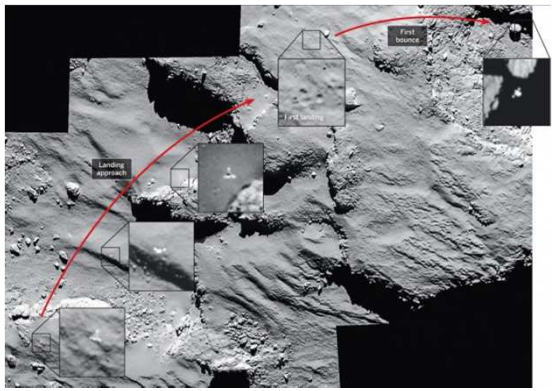
- Thermal structure of an exoplanet atmosphere from phase-resolved emission spectroscopy
  - http://www.sciencemag.org/content/early/2014/10/08/science.1256758?explicitversion=true

Nature – November 20, 2014

- Philae's 64 hours of science
  - http://www.nature.com/news/philae-s-64-hours-of-comet-science-yield-rich-data-1.16374



Science – November 21, 2014

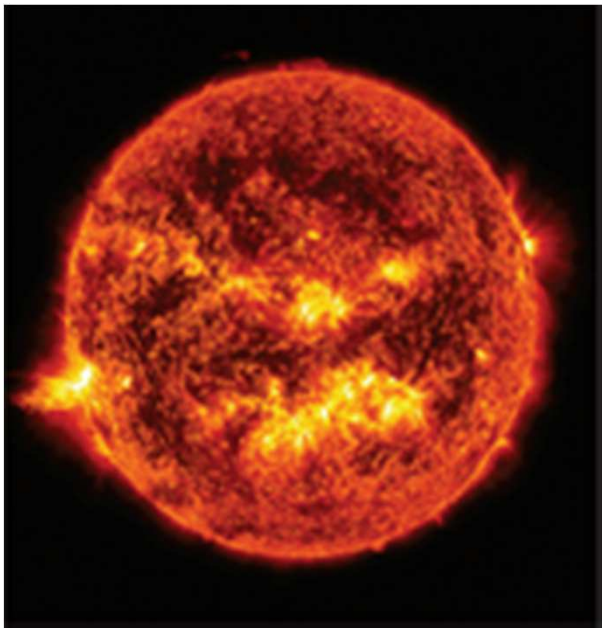


- Philae probe makes bumpy touchdown on a comet
  - http://news.sciencemag.org/space/2014/11/philae-probe-makes-bumpy-touchdown-comet

- The mystery of the dead galaxies
  - In our own Milky Way galaxy, clouds of gas are still condensing and igniting to form new stars. But amid the fertile galaxies, astronomers have found others in which the star-making process has come to a halt. For decades, scientists assumed that such "red, dead" galaxies had simply run out of gas—in other words, used up all the raw material needed for stars to form. A few years ago, however, researchers using the Hubble Space Telescope's new Cosmic Origins Spectrograph found several sterile galaxies that were swimming in vast reservoirs of hydrogen and helium gas. Now astrophysicists are tackling a new mystery: Why do dead galaxies stay dead?
  - http://news.sciencemag.org/space/2014/11/mystery-dead-galaxies

Science – November 21, 2014

- Dark matter may yield x-ray glow nearby
  - http://21stcenturysciencedoctormaranon.blogspot.com/2014/11/dark-matter-may-yield-x-ray-glow-nearby.html
  - Dark matter often has been observed to influence the dynamics of galaxies. Still, astrophysicists have great difficulty demonstrating the presence of dark matter with some type of direct detection. Now, observations made by the European XMM-Newton satellite of what should be blank sky instead show a variable background x-ray signal that could result from axions, a proposed component of dark matter. Fraser *et al.* explain that these candidate particles—a billionth the mass of an electron—could be produced by the Sun and then converted into x-rays by Earth's magnetic field. This step toward understanding dark matter still may be supported or refuted by further x-ray measurements with other observatories.



Nature – November 27 2014

- **A dust-parallax distance of 19 megaparsecs to the supermassive black hole in NGC 4151**
  - http://www.nature.com/nature/journal/v515/n7528/full/nature13914.html
- **An impenetrable barrier to ultrarelativistic electrons in the Van Allen radiation belts**
  - http://www.nature.com/nature/journal/v515/n7528/full/nature13956.html

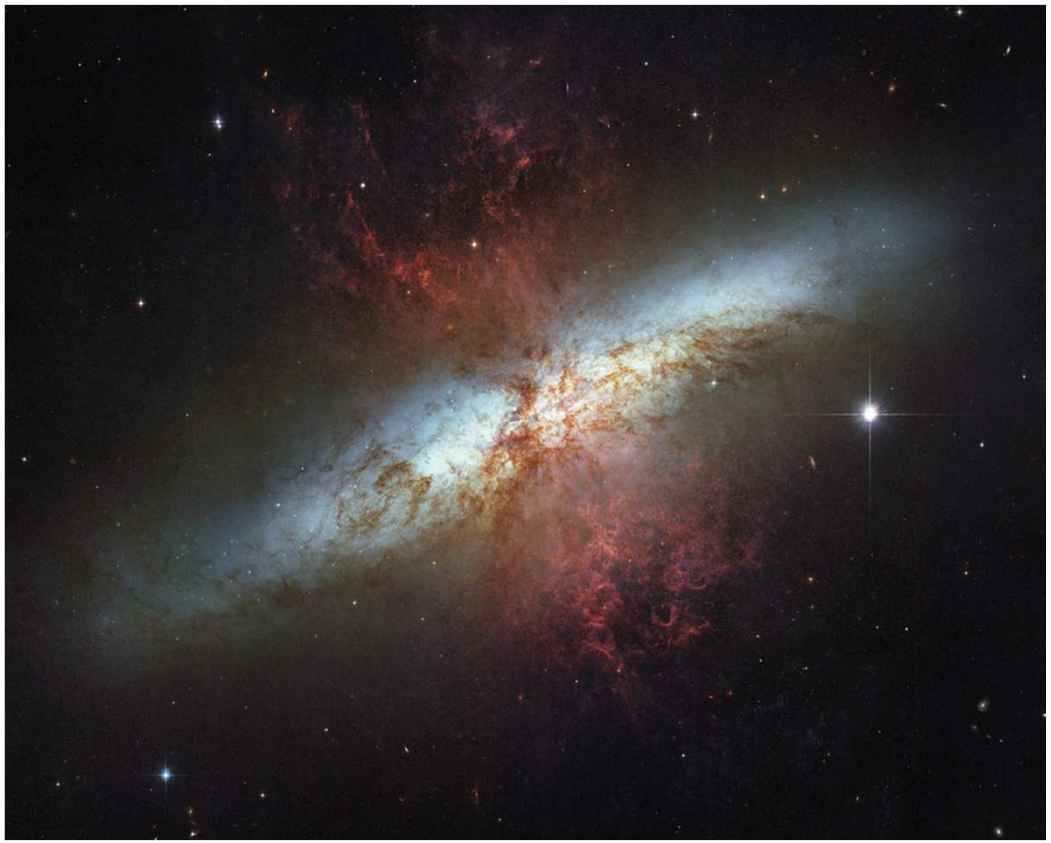
Scientific American – December 2014

- Fossil Hunting
  - http://www.nature.com/scientificamerican/journal/v311/n6/full/scientificamerican1214-54.html
  - Early in its history the Milky Way gobbled up many tiny galaxies. The cosmic rubble it left behind is now yielding fresh clues into how our corner of the universe came to be…

Science – November 28, 2014

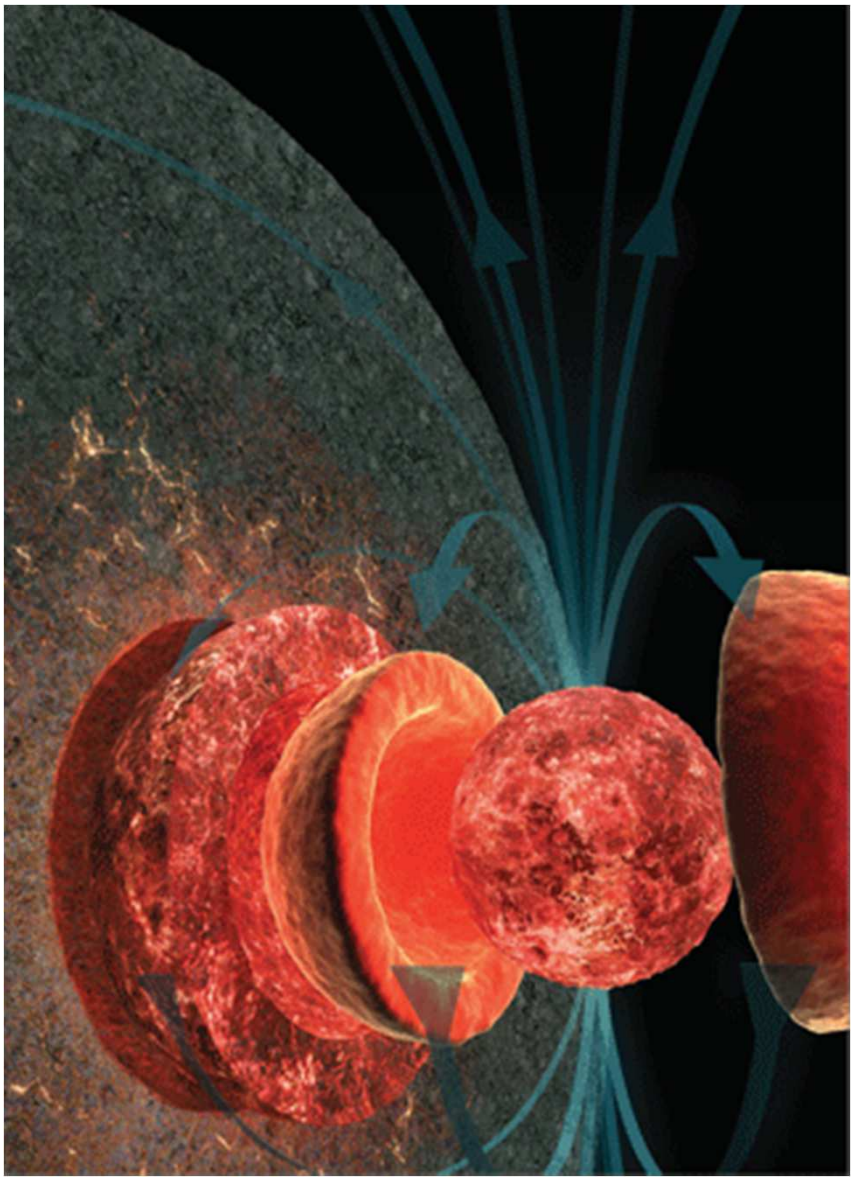
- Japan to assault asteroid
  - Hayabusa 2 will blast open carbon-rich celestial body – would bring home sample in 6 years
    - http://news.sciencemag.org/asiapacific/2014/11/japan-assault-asteroid
- Martian obsession – meteorite from ancient Mars
  - http://www.sciencemag.org/content/346/6213/1044.full
- Black hole lightning due to particle acceleration at subhorizon scales
  - http://www.sciencemag.org/content/346/6213/1080.abstract
- Solar nebula magnetic fields recorded in the Semarkona meteorite
  - https://www.physics.harvard.edu/node/436

Nature – December 4, 2014



- Stars fight back
  - http://www.nature.com/nature/journal/v516/n7529/fig_tab/516044a_F1.html
  - Galaxies contain fewer stars than predicted. The discovery of a massive galactic outflow of molecular gas in a compact galaxy, which forms stars 100 times faster than the Milky Way, may explain why.
  - This image of starburst galaxy M82 shows its disk of gas and stars (blue) and a perpendicular outflow of ionized gas (red).

Science – December 5, 2014



- The lunar dynamo
  - http://dx.doi.org/10.1126/science.1246753
  - New magnetic measurements of lunar rocks have demonstrated that the ancient Moon generated a dynamo magnetic field in its advecting liquid metallic core (innermost red shell). This dynamo may have been driven by convection, possibly powered by crystallization of the core (innermost red sphere) and/or stirring from the solid mantle (thick green shell). The magnetic field was recorded as magnetization by rocks on the lunar surface.

Nature – December 11, 2014

- Europe proposes joint Moon trips with Russia
  - http://www.nature.com/news/europe-proposes-joint-moon-trips-with-russia-1.16517
  - South pole unexplored
- H_2D observations give an age of at least one million years for a cloud core forming Sun-like stars
  - https://www.docphin.com/research/article-detail/16217253/PubMedID-25409140/H2D-observations-give-an-age-of-at-least-one-million-years-for-a-cloud-core-forming-Sun-like-stars

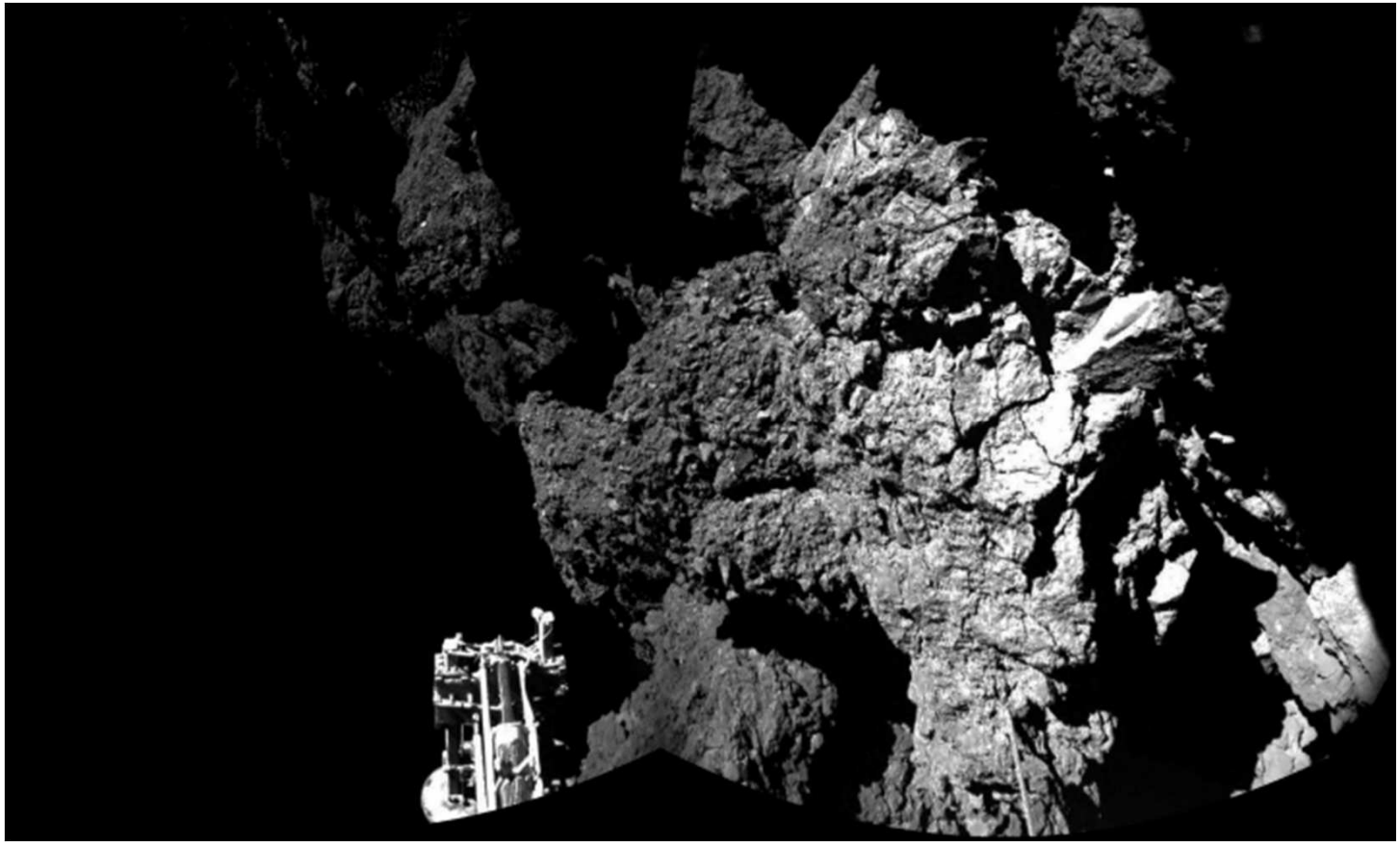
Science – December 12 , 2014

- Scratching the surface of martian habitability
  - http://www.sciencemag.org/content/346/6215/1288.summary
  - Earth and Mars, though formed at the same time from the same materials, look very different today. Early in their histories they evolved through some of the same processes, but at some point their evolutionary paths diverged, sending them in perhaps irrevocably different directions. Knowledge of the factors that contributed to such different outcomes will help to determine how planets become habitable and how common habitable planets may be. The Mars surface environment is harsh today, but in situ measurements of ancient sedimentary rock by Mars Science Laboratory reveal chemical and mineralogical evidence of past conditions that might have been more favorable for life to exist. But chemistry is only part of what is required to make an environment habitable. Physical conditions constrain the chemical reactions that underlie life processes; the chemical and physical characteristics that make planets habitable are thus entangled.

Nature – December 18/25, 2014

- Exoplanet seen from Earth
  - http://www.nature.com/nature/journal/v516/n7531/full/516291e.html
  - Using a modest-sized ground-based telescope, astronomers have spotted a planet twice the size of Earth passing in front of its host star.
- The exclusion of a significant range of ages in a massive star cluster
  - http://www.nature.com/nature/journal/v516/n7531/full/nature13969.html

Science – December 19, 2014



- Comet rendezvous (one of 2014 breakthroughs)
  - http://www.sciencemag.org/content/346/6216/1442.full

Nature – January 1, 2015

- A higher-than-predicted measurement of iron opacity at solar interior temperatures
  - http://www.nature.com/nature/journal/v517/n7532/full/nature14048.html?WT.ec_id=NATURE-20141225
- Higher-than-predicted saltation threshold wind speeds on Titan
  - http://www.nature.com/nature/journal/v517/n7532/abs/nature14088.html

Science – January 9, 2015

- A fresh look at the Pillars of Creation
  - http://www.sciencemagazinedigital.org/sciencemagazine/09_january_2015?folio=108#pg8

- Air Force turns a keen eye on space junk
  - http://news.sciencemag.org/space/2015/01/air-force-turns-keen-eye-space-junk

Nature – January 15, 2015

- No cosmology news

Scientific American – January 2015

- Dancing with the Asteroids
  - http://www.nature.com/scientificamerican/journal/v312/n1/full/scientificamerican0115-13.html
  - NASA's proposed human mission to a space rock has a bumpy road ahead
- Theoretical Particles, Still Theoretical
  - http://www.scientificamerican.com/article/sterile-neutrinos-still-theoretical/
  - Neutrinos come in three types, or flavors: electron, muon and tau. But physicists suspect that others may be out there and that they will be weird—almost never interacting with other particles. These “sterile” neutrinos may resolve some of physics' biggest mysteries. For example, they could contribute to the befuddling dark matter that apparently pervades the universe and exerts a gravitational pull on regular matter. Despite decades of looking, however, sterile neutrinos remain elusive, and the latest attempt to catch them in action recently turned up empty, too. Physicists running the international Daya Bay Reactor Neutrino Experiment in China, which studies neutrino behavior, found no evidence for sterile neutrinos after a seven-month-long hunt…
- The Dust Belt Next Door
  - http://www.scientificamerican.com/article/tau-ceti-s-dust-belt-is-huge/
  - Shining just 12 light-years from Earth, the star Tau Ceti so resembles the sun that it has appeared in numerous science-fiction stories and was the first star astronomers ever searched for signs of intelligent life, half a century ago. In 2012 Tau Ceti grew still more intriguing when astronomers reported five possible planets somewhat larger than Earth circling closer to the star than Mars orbits the sun—one of which is in the star's habitable zone. Newly released far-infrared images taken by the Herschel Space Observatory yield even more insight about Tau Ceti's solar system: greater detail about its dust belt….
- Better than Earth
  - http://www.scientificamerican.com/article/planets-more-habitable-than-earth-may-be-common-in-our-galaxy/
  - Planets quite different from our own may be the best homes for life in the universe…