Space News Update – March 2014

By Pat Williams

In March's Space News Update:

COSMOLOGISTS REPORT FIRST DIRECT EVIDENCE FOR COSMIC INFLATION. (17 March 2014)

The BICEP telescope located at the South Pole. Image Credit: Harvard-Smithsonian Center for Astrophysics

The theory of inflation states that in the epoch immediately following the big bang (10^{-34} seconds later) the universe expanded exponentially (by at least a factor of 10^{25}) causing quantum fluctuations to magnify to cosmic size. Not only does inflation help explain why the universe is so smooth on such massive scales, but also why it's flat when there's an infinite number of other possible curvatures. Alan Guth formally proposed the theory of cosmic inflation in 1981, the idea that the nascent universe passed through a phase of exponential expansion that was driven by a positive vacuum energy density (negative vacuum pressure). The results of the WMAP mission in 2006 made the case for cosmic inflation very compelling. Measurements by the BICEP and Keck Array telescope give support to the idea of cosmic inflation, confirmation of which was given on March 17, 2014, with the findings of the B-mode polarization signature.

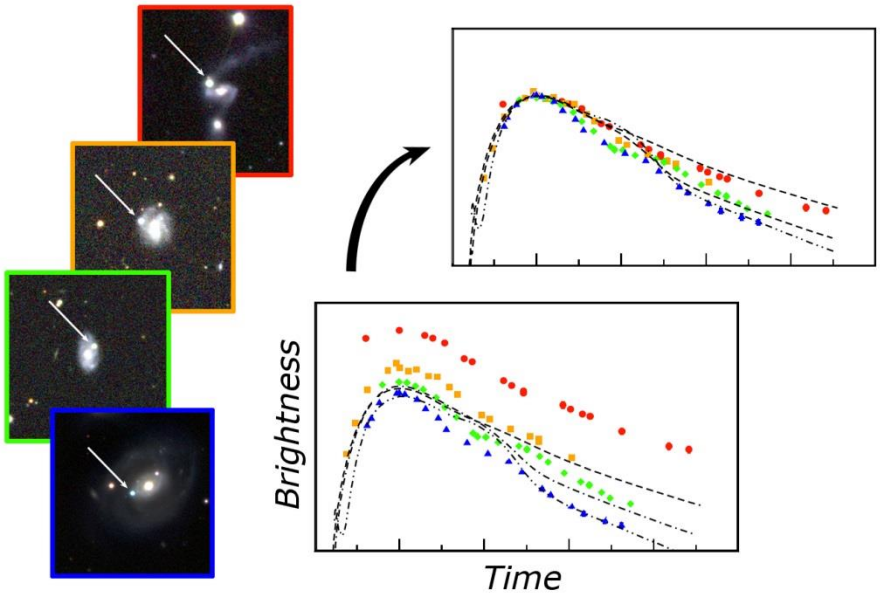
http://ucsdnews.ucsd.edu/pressrelease/cosmologists_report_evidence_for_cosmic_inflation.

http://www.jpl.nasa.gov/news/news.php?release=2014-082

http://www.cfa.harvard.edu/news/2014-05

http://www.universetoday.com/110360/landmark-discovery-new-results-provide-direct-evidence-for-cosmic-inflation/#ixzz2xq2rOEsh

STANDARD-CANDLE SUPERNOVAE ARE STILL STANDARD BUT WHY? (03 March 2014)



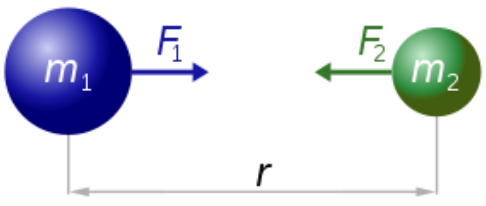
Type Ia supernovae result from the explosions of white dwarf stars. These supernovae vary widely in peak brightness, how long they stay bright, and how they fade away, as the lower graph shows. Theoretical models (dashed black lines) seek to account for the differences, for example why faint supernovae fade quickly and bright supernovae fade slowly. A new analysis by the Nearby Supernova Factory indicates that when peak brightnesses are accounted for, as shown in the upper graph, the late-time behaviours of faint and bright supernovae provide solid evidence that the white dwarfs that caused the explosions had different masses, even though the resulting blasts are all "standard candles."

These dazzling supernovae are remarkably similar in brightness, given that they are the massive thermonuclear explosions of white dwarf stars, which pack roughly the mass of our sun into a ball the size of Earth. Based on their colors and how fast they brighten and fade away, the brightnesses of different Type Ia supernovae can be standardized to within about 10 percent, yielding accurate gauges for measuring cosmic distances. Until recently, scientists thought they knew why Type Ia supernovae are all so much alike. But their favorite scenario was wrong. The white dwarfs exploding as Type Ia supernovae have a range of masses, and the resulting light-curve width is directly proportional to the total mass involved in the explosion.

http://newscenter.lbl.gov/news-releases/2014/03/03/standard-candle-supernovae/

EXPLODING STARS PROVE NEWTON'S LAW OF GRAVITY UNCHANGED OVER COSMIC TIME

(24 March 2014)



$$F_1 = F_2 = G\frac{m_1 \times m_2}{r^2}$$

Source: Wikipedia

Australian astronomers have combined all observations of supernovae ever made to determine that the strength of gravity has remained unchanged over the last nine billion years. A Type 1a supernova marks the violent death of a star called a white dwarf, which is as massive as our Sun but packed into a ball the size of our Earth. Our telescopes can detect the light from this explosion and use its brightness as a 'standard candle' to measure distances in the Universe. Professor Mould and his PhD student Syed Uddin at the Swinburne Centre for Astrophysics and Supercomputing and the ARC Centre of Excellence for All-sky Astrophysics (CAASTRO) assumed that these supernova explosions happen when a white dwarf reaches a critical mass or after colliding with other stars to 'tip it over the edge'. "This critical mass depends on Newton's gravitational constant G and allows us to monitor it over billions of years of cosmic time – instead of only decades, as was the case in previous studies," Professor Mould said.

Despite these vastly different time spans, their results agree with findings from the Lunar Laser Ranging Experiment that has been measuring the distance between the Earth and the Moon since NASA's Apollo missions in the 1960s and has been able to monitor possible variations in G at very high precision.

http://www.swinburne.edu.au/media-centre/news/2014/03/exploding-stars-prove-newtons-gravity-unchanged-over-cosmic-time.html

GALAXIES IN THE EARLY UNIVERSE MATURE BEYOND THEIR YEARS. (11 March 2014)

An international team of researchers, including astronomers from Swinburne University of Technology, has discovered the most distant examples of galaxies in the early Universe that were already mature and massive.

The mature galaxies were found at a record-breaking distance of 12 billion light years, seen when the Universe was just 1.6 billion years old. Their existence at such an early time raises new questions about what forced them to grow up so quickly.

Astronomers used deep images at near-infrared wavelengths to search for galaxies in the early Universe with red colours. These red colours indicate the presence of old stars and a lack of active star formation. Surprisingly, they located 15 galaxies at an average distance of 12 billion light years – only 1.6 billion years after the Big Bang.

"This is the best evidence to date that these galaxies grew up in a hurry. People have reported 'old' galaxies before, but it was never clear until our data that they were actually 'old'. The excellent imaging products from the Magellan telescope allowed us to prove they are indeed 'old'."

The finding raises new questions about how these galaxies formed so rapidly and why they stopped forming stars so early.

http://www.swinburne.edu.au/media-centre/news/2014/03/galaxies-in-the-early-universe-mature-beyond-their-years.html

STUDY FINDS ASTRONAUTS' HEARTS BECOME MORE SPHERICAL IN SPACE. (29 March 2014)

New findings from a study of 12 astronauts show the heart becomes more spherical when exposed to long periods of microgravity in space, a change that could lead to cardiac problems, according to research to be presented at the American College of Cardiology's 63rd Annual Scientific Session. The astronauts' more spherical heart shape appears to be temporary, with the heart returning to its normal elongated shape shortly after the return to Earth.

With implications for an eventual manned mission to Mars, the findings represent an important step toward understanding how a spaceflight of 18 months or more could affect astronauts' heart health.

As a result of this finding the exercise regimens developed for astronauts could also be used to help maintain heart health in people on Earth who have severe physical limitations, such as people on extended bed rest or those with heart failure.

http://www.cardiosource.org/News-Media/Media-Center/News-Releases/2014/03/May-Hearts-in-Space.aspx

LONELY PLANET FIRST OF ITS KIND. (10 March 2014)

Multicolour image from the Pan-STARRS1 telescope of the free-floating planet PSO J318.5-22 in the constellation of Capricornus. The planet is extremely cold and faint, about 100 billion times fainter in optical light than the planet Venus. Most of its energy is emitted at infrared wavelengths. *Credit: Metcalfe & Pan-STARRS 1 Science Consortium.*

PSO J318.5-22 has mass, temperature and brightness. The absence of a parent star makes this "lonely planet" particularly valuable for research purposes; it can be studied without interference from the massive amount of light that a sun-like star gives off. The planet is aged at 12 million years old.

http://www.ifa.hawaii.edu/info/press-releases/LonelyPlanet/

http://www.bucknell.edu/news-and-media/current-news/2014/march/lonely-planet-the-first-of-its-kind.html

LINKS TO OTHER SPACE NEWS PUBLISHED IN MARCH 2014

Hubble witnesses an asteroid mysteriously disintegrating. (6 March 2014)
http://hubblesite.org/newscenter/archive/releases/2014/15/full/

First ring system around an asteroid. (26 March 2014)
http://www.eso.org/public/news/eso1410/

Chandra and XMM-Newton provide direct measurement of distant black hole's spin. (5 March 2014)
http://www.nasa.gov/press/2014/march/chandra-and-xmm-newton-provide-direct-measurement-of-distant-black-holes-spin/#.Uz8ANPldWSo

The search for seeds of black holes. (26 March 2014)
http://www.jpl.nasa.gov/news/news.php?release=2014-093

Crashing comets explain gas clump around young star. (6 March 2014)
http://www.eso.org/public/unitedkingdom/news/eso1408/

Philae lander – nearing the end of hibernation. (Comet) (26 March 2014)
http://www.dlr.de/dlr/presse/en/desktopdefault.aspx/tabid-10172/213_read-9858/#gallery/13413

Astrophysicists target mystery of powerful particles. (Cosmic Rays) (21 March 2014)
http://www.uchicago.edu/features/astrophysicists_target_mystery_of_powerful_particles/

New Van Allen Probes observations helping improve space weather models. (7 March 2014)
http://www.nasa.gov/content/goddard/van-allen-probes-observations-improve-space-weather-models/#.Uz8Ib_ldWSo

THEMIS discovers new process that protects Earth from space weather. (6 March 2014)
http://www.nasa.gov/content/goddard/themis-discovers-new-process-that-protects-earth-from-space-weather/

Pinpointing sources of greenhouse gases. (5 March 2014)
http://www.esa.int/Our_Activities/Observing_the_Earth/The_Living_Planet_Programme/Campaigns/Pinpointing_sources_of_greenhouse_gases

First images available from NASA-JAXA global rain and snowfall satellite. (25 March 2015)
http://www.nasa.gov/press/2014/march/first-images-available-from-nasa-jaxa-global-rain-and-snowfall-satellite/#.Uz8J9fldWSp

Monitoring air quality takes the next step. (28 March 2014)
http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Monitoring_air_quality_takes_next_step

Experiment recreates crust of the moon Europa. (12 March 2014)
http://www.agenciasinc.es/en/News/An-experiment-recreates-the-crust-of-the-moon-Europa

'Dimer molecules' aid study of exoplanet pressure, hunt for life. (4 March 2014)
http://www.washington.edu/news/2014/03/04/dimer-molecules-aid-study-of-exoplanet-pressure-hunt-for-life/

A small step towards discovering habitable earths. (4 March 2014)
http://seagerexoplanets.mit.edu/research.htm

Space sunflower may help snap pictures of planets. (13 March 2014)
http://www.jpl.nasa.gov/news/news.php?release=2014-089

Faint strings of galaxies inside empty space. (11 March 2014)
http://www.icrar.org/news/news_items/media-releases/these-arent-the-voids-youre-looking-for

Mapping out Earth's place in the Universe among 'Council of Giants'. (11 March 2014)

http://news.yorku.ca/2014/03/11/york-u-astronomer-maps-out-earths-place-in-the-universe-among-council-of-giants/

X-ray laser FLASH spies deep into giant gas planets. (11 March 2014)
http://www.desy.de/information__services/press/pressreleases/2014/pr_110314/index_eng.html

Working to solve the puzzle of orbiting satellite repair. (6 March 2014)
http://www.nasa.gov/mission_pages/station/research/news/satellite_repair_in_orbit/#.Uz8P-_ldWSo

Space station crew returns to Earth, lands safely in Kazakhstan. (10 March 2014)
http://www.nasa.gov/press/2014/march/space-station-crew-returns-to-earth-lands-safely-in-kazakhstan/#.Uz8ROfldWSo

New crew launches to space station to continue scientific research. (25 March 2014)
http://www.nasa.gov/press/2014/march/new-crew-launches-to-space-station-to-continue-scientific-research/#.Uz8R6PldWSo

Lockheed Martin researchers achieve breakthrough in robotics for space exploration. (11 March 2014)
http://www.lockheedmartin.com/us/news/press-releases/2014/march/0310-ss-robotics.html

UF/IFAS scientists to conduct experiment on plants in space. (11 March 2014)
http://news.ufl.edu/2014/03/11/plants-in-space/

NASA's latest Smartphone satellite ready for launch. (13 March 2014)
http://www.nasa.gov/content/nasas-latest-smartphone-satellite-ready-for-launch/#.Uz8Tz_ldWSo

ATV-5 to test new rendezvous sensors. (18 March 2014)
http://www.esa.int/Our_Activities/Human_Spaceflight/ATV/ATV-5_set_to_test_new_rendezvous_sensors

Amazing anatomy of James Webb Space Telescope mirrors. (20 March 2014)
http://www.nasa.gov/content/goddard/the-amazing-anatomy-of-james-webb-space-telescope-mirrors/#.Uz8VwPldWSo

NASA orbiter finds new gully channel on Mars. (19 March 2014)
http://www.jpl.nasa.gov/news/news.php?release=2014-086

Mars rover's next stop has sandstone variations. (24 March 2014)
http://www.jpl.nasa.gov/news/news.php?release=2014-090

Mercury's contraction much greater than thought. (16 March 2014)
http://carnegiescience.edu/news/mercury%E2%80%99s_contraction_much_greater_thought

Study on lunar crater counting shows crowdsourcing effective, accurate too! (13 March 2014)
http://www.colorado.edu/news/releases/2014/03/13/cu-boulder-led-study-lunar-crater-counting-shows-crowdsourcing-effective

NASA releases first interactive mosaic of lunar north pole. (18 March 2014)
http://www.nasa.gov/press/2014/march/nasa-releases-first-interactive-mosaic-of-lunar-north-pole/#.Uz8oHPldWSo

WISE survey finds thousands of new stars, but no 'Planet X'. (7 March 2014)
http://www.nasa.gov/press/2014/march/nasas-wise-survey-finds-thousands-of-new-stars-but-no-planet-x/#.Uz8onvldWSo

Catching signals from a speeding satellite. (7 March 2014)
http://www.esa.int/Our_Activities/Operations/Catching_signals_from_a_speeding_satellite

Surface of Titan sea is mirror smooth. (19 March 2014)
https://pangea.stanford.edu/news/surface-titan-sea-mirror-smooth

New most-distant member of solar system. (26 March 2014)
http://www.nasa.gov/content/nasa-supported-research-helps-redefine-solar-systems-edge/#.Uz8rMvldWSo

NASA marks major programmatic milestone for spaceport of the future. (26 March 2014)
NASA marks major programmatic milestone for spaceport of the future

Mystery of planet-forming disks explained by magnetism. (6 March 2014)
http://www.jpl.nasa.gov/news/news.php?release=2014-071

Every red dwarf star has at least one planet. (4 March 2014)
http://www.herts.ac.uk/about-us/news/2014/march/every-red-dwarf-star-has-at-least-one-planet

VLT spots largest yellow hypergiant star. (12 March 2014)
http://www.eso.org/public/unitedkingdom/news/eso1409/

Death stars in Orion blast planets before they even form. (10 March 2013)

https://public.nrao.edu/news/pressreleases/death-stars-in-orion

GOSSS survey clears the way for study of massive stars. (6 March 2014)
http://www.iaa.es/content/gosss-survey-clears-way-study-massive-stars

Simple, like a neutron star. (25 March 2014)
http://www.sissa.it/index.php/about/news/general/2905
http://www.sciencedaily.com/releases/2014/03/140325094429.htm

Fierce solar magnetic storm barely missed Earth in 2012. (18 March 2014)
http://newscenter.berkeley.edu/2014/03/18/fierce-solar-magnetic-storm-barely-missed-earth-in-2012/

How to look into the solar interior. (25 March 2014)
http://www.sciencedaily.com/releases/2014/03/140325133538.htm http://www.msu.ru/en/

First sightings of solar flare phenomena confirm 3D models of space weather. (27 March 2014)
http://www.cam.ac.uk/research/news/first-sightings-of-solar-flare-phenomena-confirm-3d-models-of-space-weather

New view of supernova death throes. (18 March 2014)
http://www.aip.org/publishing/journal-highlights/new-view-supernova-death-throes
http://scitation.aip.org/content/aip/journal/adva/4/4/10.1063/1.4867384

Hardy star survives supernova blast. (20 March 2014)
http://www.nasa.gov/mission_pages/chandra/multimedia/dhardy-star.html#.Uz80HvldWSo

Herschel completes largest survey of cosmic dust in the local universe. (18 March 2014)
http://www.swinburne.edu.au/media-centre/news/2014/03/astronomers-complete-cosmic-dust-census.html

'**Cosmic barometer' could reveal violent events in universe's past.** (31 March 2014)
http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news_31-3-2014-10-45-12

Van Allen probes reveal zebra stripes in space. (19 March 2014)
http://www.nasa.gov/content/goddard/van-allen-probes-reveal-zebra-stripes-in-space/#.Uz81H_ldWSo

Venus Glory. (11 March 2014) http://www.esa.int/Our_Activities/Space_Science/Venus_Express/Venus_glory

Riddle of celestial archaeology solved. (27 March 2014)
http://www2.le.ac.uk/offices/press/press-releases/2014/march/scientists-solve-riddle-of-celestial-archaeology

Bright pulses of light could make space veggies more nutritious. (4 March 2014)
http://www.colorado.edu/news/releases/2014/03/04/bright-pulses-light-could-make-space-veggies-more-nutritious-says-cu

Reducing debris threat from satellite batteries. (13 March 2014)
http://www.esa.int/Our_Activities/Space_Engineering/Clean_Space/Reducing_debris_threat_from_satellite_batteries

NASA tests new robotic refuelling technologies. (5 March 2014)
http://www.nasa.gov/content/goddard/nasa-tests-new-robotic-refueling-technologies/#.Uz8aCfldWSo

Lick's Automated Planet Finder. (25 March 2014) http://news.ucsc.edu/2014/03/apf-telescope.html

NASA marks major programmatic milestone for spaceport of the future. (26 March 2014)
http://www.nasa.gov/press/2014/march/nasa-marks-major-programmatic-milestone-for-spaceport-of-the-future/#.Uz8YnPldWSo