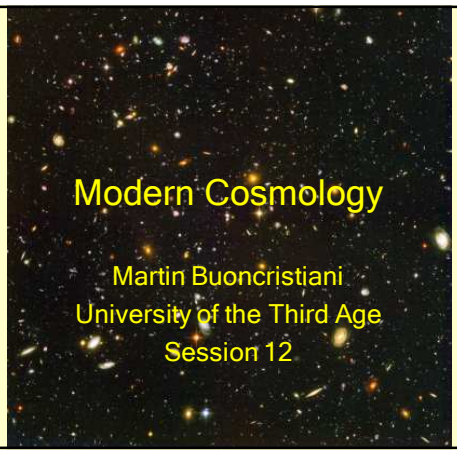


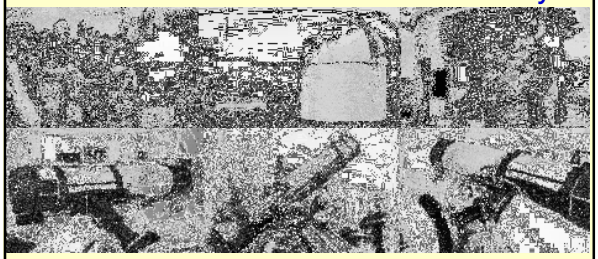
A Long Time Ago in Galaxies Far, Far Away...

Dr. Amanda Bauer
Super Science Fellow
Australian Astronomical Observatory

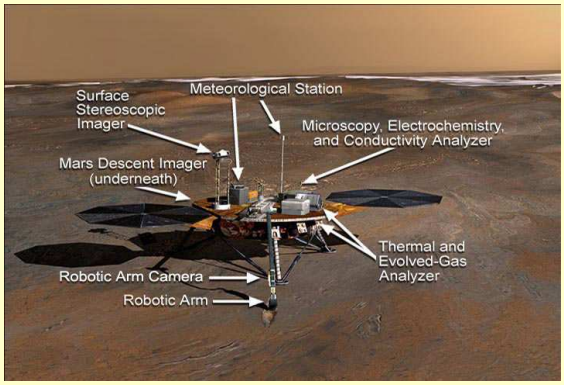
When: 6pm, Thursday 13 September, 2012

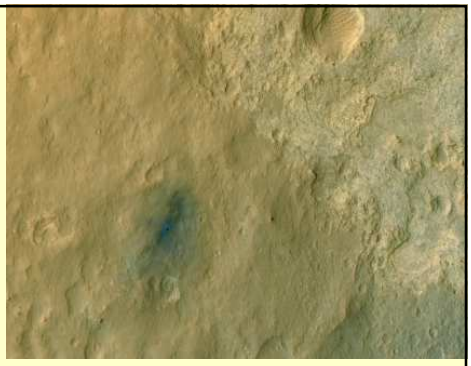
Where: To be confirmed

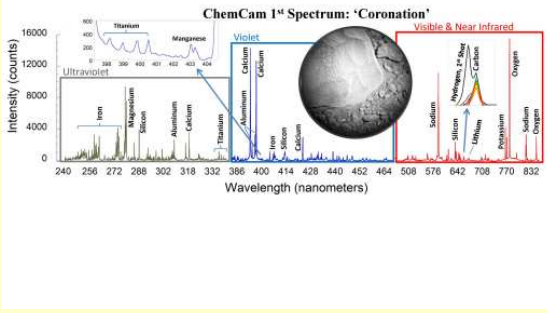
News from Mt. Burnett Observatory

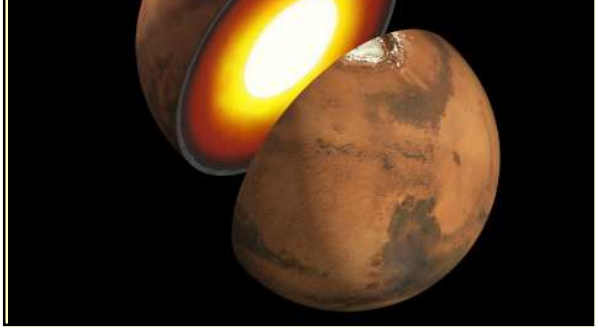


... other News









Much of the work was carried out at an optical telescope built in the 1930s

But pulling off the same trick with visible light has seemed unlikely until now.
It is the extreme nature of the pair of white dwarf stars known as J0651 - each a substantia
As members of the same team reported in Astrophysical Journal in 2011, the pair orbit eac
Since that discovery, the team has been keenly watching the pair "eclipse" one another, w
Over a period of 13 months, the team saw the orbital period reduce by less than a thousar
"A lot of these indirect measurements have taken people years, mostly because the orbits
Mr Hermes told BBC News that he liked the idea that such a groundbreaking result was es
"There have been 30 years of using radio telescopes and timing pulsars, but this is the firs
The team will continue to watch the pair's tightening orbit, and the expected eclipse time s
These, such as the proposed eLisa project, aim to measure the tiny relative movements o
"It would be a really nice confirmation if we got one of these laser interferometer missions
"We've crunched the numbers, and eLisa would be able to detect this thing in about a wee

More on This Story

Related Stories

•Wave hunters look to the future

Hubble Watches Star Clusters on a Collision Course
Astronomers using data from NASA's Hubble Space Telescope caught two clusters full of massive stars that may be in the early stages of merging. The 30 Doradus Nebula is 170,000 light-years from Earth. What at first was thought to be only one cluster in the core of the massive star-forming region 30 Doradus has been found to be a composite of two clusters that differ in age by about one million years.

The entire 30 Doradus complex has been an active star-forming region for 25 million years, and it is currently unknown how much longer this region can continue creating new stars. Smaller systems that merge into larger ones could help to explain the origin of some of the largest known star clusters. The Hubble observations, made with the Wide Field Camera 3, were taken Oct. 20-27, 2009. The blue color is light from the hottest, most massive stars; the green from the glow of oxygen; and the red from fluorescing hydrogen.

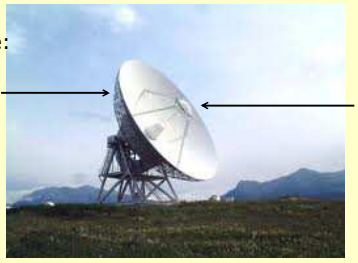
Image Credit: NASA, ESA, and E. Sabbi (ESA/STScI)

About Radio Telescopes

Detectors of radio waves from space

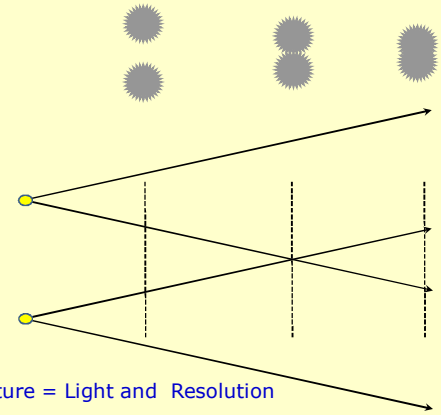
Directional antenna
Mirror plus receiver

Mirrors are:
Plane
Spherical
Parabolic



Reciever

Parkes Observatory (CSIRO) "The Dish"



Aperture = Light and Resolution

Range of the SKA

Frequency (MHz)	Wavelength (m)	Photon Energy (eV)
1	300	4×10^{-9}
10	30	4×10^{-8}
100	3	4×10^{-7}
1000 (1GHz)	0.3 (30 cm)	4×10^{-6}
10,000 (10GHz)	0.03 (3 cm)	4×10^{-5}
100,000 (100 GHz)	0.003 (.3 cm)	4×10^{-4}
1,000,000 (1 THz)	0.0003 (.3 mm)	4×10^{-3}

70 MHz 4 m
10 GHz 3 cm

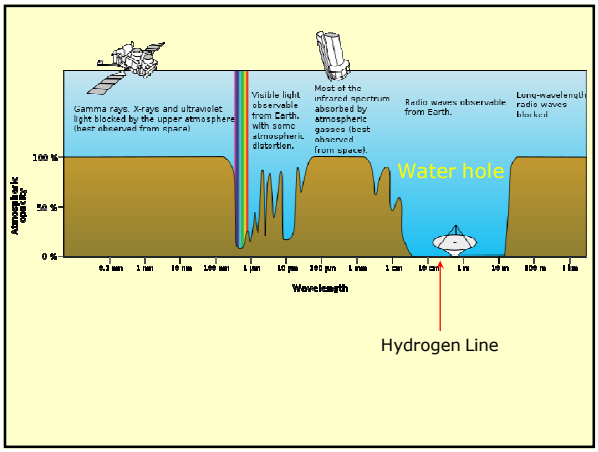
The Radio Telescope Spectrum

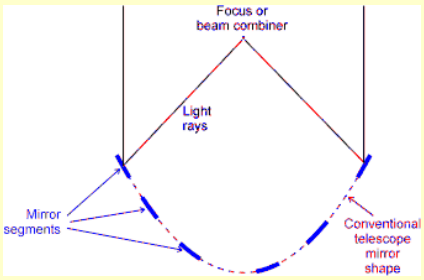
Channel 37 – 608 – 614 MHz
Restricted use of a TV channel in US and Canada

Hydrogen Line 21 cm 1420 MHz
(21.10617405413 cm –> 1420.40575177 MHz)

The Water Hole 1,420 – 1,666 MHz
Search for Extra-Terrestrial Intelligence (SETI)

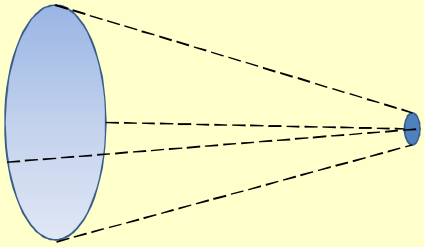
Wilkerson Microwave Anomaly Probe
23, 33, 41, 61, 94 GHz





Radio Interferometer

Field of View



Aperture Synthesis

Measure both the amplitude and the phase of the incoming wave
Cannot be done for optical waves

Control the aperture, field of view and steerability

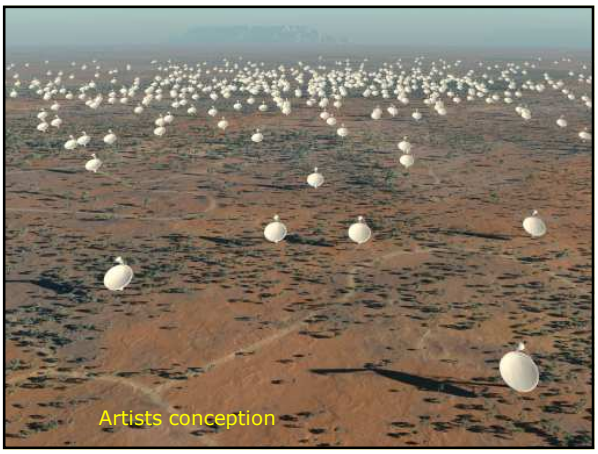
The proposed arrays will increase the precision dramatically
uncertainty down from 10% to 1 %

The Square Kilometer Array Radio will be the world's biggest telescope
one of the biggest scientific projects ever!

On 25 May 2012 the SKA Organisation announced the SKA would be shared between South Africa and Australia
with a majority share going to South Africa.

Factors In the Decision

Ionosphere Stability and Charged Particles
Radio Frequency Interference (RFI)
Troposphere Stability
Land Features
Availability of Electric Power
Costs (infrastructure, transportation)
Legal Issues (mining rights, indigenous rights, restrictions on new RF sources)
Social and Political Issues



SKA Organisation, headquarters in Manchester, UK.
http://www.skatelescope.org/

Australia/New Zealand
http://www.ska.gov.au/Pages/default.aspx
http://www.ska.edu.au/

South Africa
http://www.ska.ac.za/

1) Investigating galaxy evolution, cosmology and dark energy
Hydrogen Line 21 cm 1420 MHz

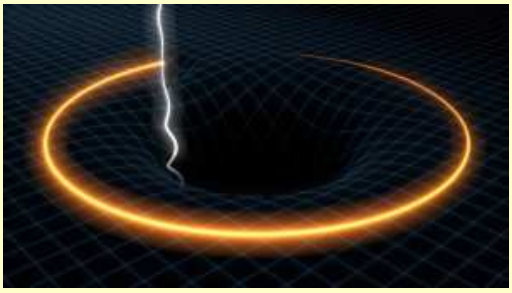
2) Strong-field tests of gravity using pulsars and black holes

3) The origin and evolution of Cosmic magnetism
Faraday Rotation

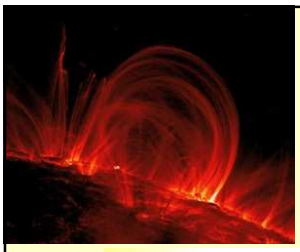
4) Cradle of Life Search for life and planets

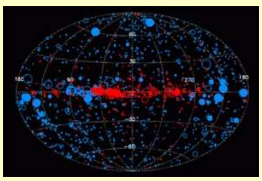
5) Probing the Dark Ages (300,000 to 1 billion years) The first stars and black holes

6) Unknown opportunities



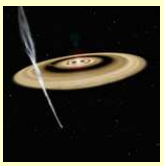
Strong-field tests of gravity using pulsars and black holes



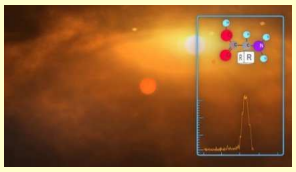


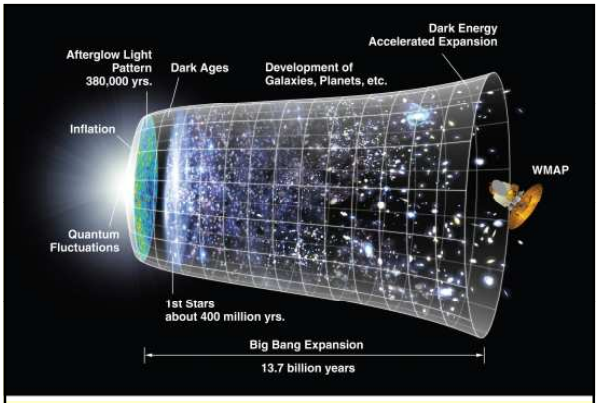
Faraday Rotation

Search for Life and New Planets



Astro-biology





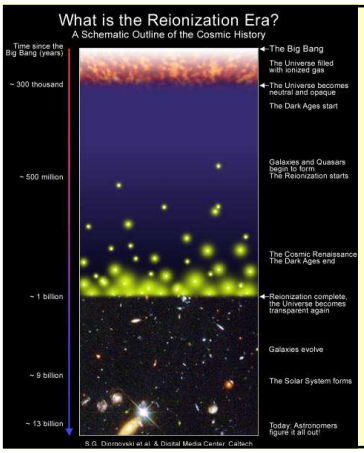
Dark Ages

300,000 yrs	smooth universe recombination first luminous objects appear
500 M yrs	galaxies form re-ionization starts
1 B yrs	re-ionization ends

The Molonglo Observatory Synthesis Telescope (MOST) 843 MHz, operated by the University of Sydney.

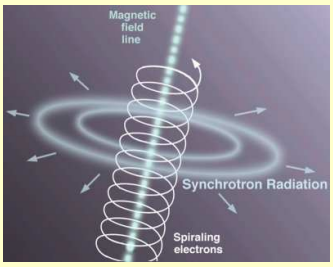
modification of the East-West arm of the former *Molonglo Cross Telescope,* a larger version of the Mills Cross Telescope.

MOST is developing technology for the Australian Square Kilometer Array telescope. Since 2003 work has proceeded on the SKA Molonglo Prototype (SKAMP)

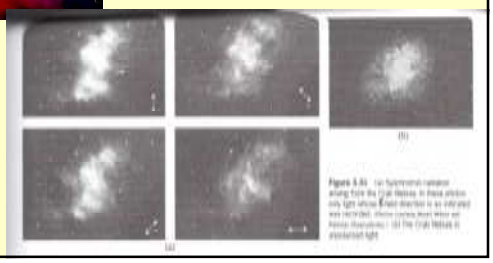


Sources of radio waves from Space

Accelerating charges
for example synchrotron radiation



Synchrotron radiation from
Crab Nebula



The world's biggest single aperture Radio telescope is at Arecibo. Puerto Rico

305 meter
diameter

The largest steerable radio telescope in Europe is at Effelsberg, Germany

100
meter
diameter

Green Bank
100 meter
in the USA

Lovell Telescope at Jodrell Bank, UK