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Why we celebrate astronomy

Comments from the Chief Scientist at the
Australian Launch of the International Year of
Astronomy

Presentation at Questacon – The National
Science and Technology Centre

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Terrace, Canberra

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Thank you Patrick for that kind introduction.

First, I too would like to acknowledge the traditional owners of the land on which we meet and pay my respects to their elders past and present.

A Celebration

This year, 2009, we – as Australians and global citizens -- celebrate astronomy, the study of the sky above us.

We celebrate the entirety of the universe, which though largely beyond our reach, is not beyond our understanding or our appreciation.

We celebrate too the astronomers who, throughout the ages and on every continent on Earth, have watched and charted the skies in order to discover patterns in time and space.

- Patterns in the sky that became a manual for when to plant, when to hunt, and when to harvest the bounty of the land.

- Patterns that helped our ancestors find their way home when lost, and explore uncharted seas with more confidence.
- Patterns that illustrated the greatest stories, lessons and celebrations of the diverse cultures of our tiny world.

Galileo

One astronomer who studied those patterns with curiosity and honesty, diligent observation and mathematics, also used a new tool of his time, a technological invention we now call the telescope.

His work has given him the title of Father of Astronomy and in many eyes he is the Father of all Modern Science as well.

Four hundred years ago, Galileo Galilei trained on the sky his own small handmade telescope, a device likely inspired by one that has been patented just a few months earlier by Hans Lippershey of the Netherlands.

Among Galileo's scientific observations were

- the four giant satellites that orbit Jupiter,

- the odd-shape of Saturn (which we now know to be due to its rings),
- imperfections on the surface of the Sun due to moving dark spots.

In addition, Galileo observed the remarkable truth that Venus, the morning and evening star, also changed, undergoing a regular series of crescent phases (just as the Moon does), all of which could be seen from Earth.

These observations were evident to anyone willing to scrutinize the heavens through a telescope.

They provided firm scientific evidence that the planets revolved around the Sun, displacing Earth from the centre of man's Universe.

However, inconvenient that truth might have been for some at the time, humanity's understanding of its place in the cosmos was fundamentally altered.

Transformative Power of Astronomy

Astronomy continues to challenge us by placing the human experience in the context of a vast span of space and time.

We now know that the nearest star (other than the Sun) is more than one-quarter of a million times further from us than our own Sun. The centre of our own cosmic metropolis, the Milky Way Galaxy, another 6,000 times further still.

But this is only our hometown.

If you can imagine a distance 6,000 larger still, you will have the scale on which galaxies group together in clusters of clusters.

These are the largest structures of the Universe, which are scattered like so many continents across the emptiness of the cosmos.

Our small planet Earth is dwarfed by this enormity, displacing it far from the historical centre it enjoyed in the days before Galileo.

Moreover, the sense of time enjoyed by humans is fleeting compared to that presided over by cosmic objects.

Together with its sister sciences, astronomy has helped to reconstruct the history of earth.

Earth formed after the Universe obtained about 2/3 of its current age.

Now 4.5 billion and a bit years old, Earth was only about one-tenth its current age when algae formed.

By half its current age, these algae are believed to have been largely responsible for the increase in atmospheric oxygen we enjoy today.

During much of the last 5% of the Earth's life, dinosaurs ruled its surface.

By comparison, humans have enjoyed our planet's bounty for only about 1% as long as the dinosaurs, a tiny fraction of Earth's history.

While these lessons may be humbling, they also are invigorating and transformational.

Astronomy reminds us that we must take care of this precious planet in a universe of otherwise near-empty space.

And it teaches us that any gulf that appears to separate different human cultures shrinks to insignificance against the chasms of space and time that mark the cosmos.

Australian Astronomy

Naturally, as Australians, we take special pride in our contributions to astronomy and celebrate these as well.

And today, I am pleased to say, the Minister for Innovation, Industry, Science and Research will be announcing funding to celebrate IYA and to produce a book on prominent Australian astronomers, and their work and discoveries.

- Australian astronomers have discovered planetary systems orbiting other stars --- other Suns, each with their own revolving planets.
- Australian astronomers have discovered radio beacons emitted from the dense cores of exhausted stars in the far-flung reaches of our Milky Way.

- And using some of the largest explosions in the cosmos --- the brilliant death throes of supernovae --- Australians have discovered an energy, called Dark Energy, that competes with the attractive force of gravity to cause the expansion of the Universe to accelerate.

No small wonder then, that the impact of Australian astronomical research has climbed markedly over the past decade. It is one of Australia's highest impact sciences.

Together with international collaborators, Australians publish 3 to 4 percent of the world's astronomical research output, and have an even higher share of the citations.

International Astronomy

As Australians, we continue the international spirit of astronomy by joining with our colleagues around the world in laying plans for two future telescopes of which Galileo could not even dream.

With international partners, Australia plans to build the Giant Magellan telescope in Chile --- a telescope far larger than any now in existence, capable of taking images 10 times

sharper than those produced by the Hubble Space Telescope.

As member of a worldwide team, Australia is helping to design the world's largest radio telescope, the Square Kilometre Array, which we know would benefit from location in the extraordinarily radio-quiet vastness of our own Western Australia.

These quiet, but gigantic instruments will listen to the symphony of the cosmos in the varied melodies of optical astronomy and the deep booming harmonies of radio astronomy.

The International Year of Astronomy 2009 is a global effort initiated by the International Astronomical Union and UNESCO to mark the important contributions of astronomy to society and culture.

The Universe is Yours

The theme of this year-long party is "The Universe, Yours to Discover". I invite you to do just that, reconnecting with the night sky, the common heritage of all humanity.



Chief Scientist

2009 International Year of Astronomy



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The banner that you can see behind me shows what many Indigenous nations within Australia know as the Emu in the Sky and there are many beautiful stories around this figure.

Best seen between May and September, it is a spectacular sight caused by the silhouettes of dust clouds between us and the millions of stars populating the dense inner regions of our Milky Way Galaxy.

This enormous figure, spanning an arc as large as that from our uplifted arms, can be seen only in areas well removed from the polluting lights of our cities and large towns.

This year will be filled with events that can bring you closer to the sky and to astronomy. You will hear more about some of these today.

But if you do nothing else this year, make sure that you find a place dark enough to find the Emu.

It's a spectacular sight and once you've seen it, the Milky Way --- your home --- will never look the same again.

Neither will the wasteful lights that illuminate the night sky to such an extent that a fifth of the world's population cannot even see the Milky Way¹.

The benefits of reducing the number of night lights go far beyond creating a clearer view of the heavens.

Less and better quality-controlled lighting aimed downward rather than up, would conserve energy, protect wildlife and benefit human health.

The sky belongs to everybody and I encourage all Australians to get involved.

Participate in this global celebration of how humanity is using astronomy to find its place in space and time.

Thank you.

¹ *Nature* **457**, 27 (1 January 2009)