

Space secrets finally seeing the light of day

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THE 'out of nothingness' Big Bang theory has never been a favourite of mine. It raises too many difficult questions for my liking.

Yet there is plenty of evidence pointing to an early superhot phase in which the primordial elements — hydrogen, helium and traces of three other very light atoms — were 'cooked' to set their relative abundances.

Some cosmologists consider that the universe 'bounced' back out of the collapse of an earlier universe.

Conceivably this may have served to adjust the physical parameters, which led to the form of our present universe being as it is, and in so doing created hospitable conditions for the eventual emergence of life, which includes us of course.

So the current state of play is that we don't know precisely what went before the superhot phase, and we don't have much idea what went on in the later dark era before galaxies began to form.

It was dark because the stupendous brilliance of the hot phase faded to invisible heat well before the first light came from stars in the newborn galaxies.

There are a number of clues, such as the tendency of galaxies to exist in sheets like films of gargantuan soap-bubbles, but interpretation of these clues is rather elusive.

Now, for the first time, astronomers are able to look back in time to the end of the dark ages, 90% of the way back to the original hot phase.

And guess what? Those intriguing quasars, which have been somewhat of a puzzle for the 30 years since their discovery, are the key.

They are now reckoned to be the cores of galaxies in the pro-

cess of formation.

The problem lay with their light.

In those early days the abundant clouds of hydrogen strongly absorbed the blue light they emitted, leaving only the longer-wave red light.

The well-known red-shift of distant objects stretched the wavelength of the red light, pushing it far into the infra-red and making it hard to detect.

However, the quasars' original infra-red light was stretched towards the microwave region of the spectrum where powerful radio telescopes do their thing.

Here's where the Australia Telescope at Culgoora excels.

It is one of only two radio telescope arrays in the world able to detect these distant radio quasars at the edge of the observable universe.

It now seems clear that these quasars were the embryos of the first galaxies to condense out of the vast hydrogen clouds of creation.

The visible quasars came later when the universe had expanded and dispersed the hydrogen sufficiently for their ultra-violet light to escape complete absorption and be red shifted (by a lesser amount due to the later age of the universe) to the visible region of the spectrum where the biggest optical telescopes can pick them up.

It is particularly gratifying that our wonderful Australia Telescope, the opening ceremony of which I was privileged to attend as a member (then) of the National Committee for Astronomy, has made an outstanding contribution to cosmology by penetrating the hidden past so successfully.

It has surely justified Prime Minister Hawke's glowing forecast for its future as a thoroughly worthy Australian Bicentennial Project.