ALICE, our wonderland

Q HOW did the universe begin?

A SCIENTISTS think that the universe began with the Big Bang, after which matter existed as a very hot, dense particle soup. Somehow, from this soup, the complex structure of the current universe emerged.

All of the matter in the universe, everything you see, is actually made of atoms. Atoms are unimaginably small. Imagine the head of a pin. There are more atoms in that pinhead than there are grains of sand at Glenelg beach. These tiny atoms are made of even smaller things. Every atom has a nucleus, which is about 10,000 times smaller than the atom. Nuclei are made of protons and neutrons, collectively called nucleons.

The structure of matter is more complex still. The nucleons in each nucleus are formed from smaller particles, called quarks, bound together by gluons (particles that act like glue). Although nucleons make up 99.9 per cent of the mass in our solar system, their structure is not fully understood.

Protons and neutrons weigh one hundred times more than their constituent quarks but the remaining mass has not yet been explained. Quarks are particularly difficult to study as they do not exist alone, they have been bound tightly into protons and neutrons since moments after the Big Bang.

The ALICE experiment at the Large Hadron Collider (CERN) in Switzerland is designed to explore the formation and evolution of this complex structure. Scientists at ALICE are trying to re-create and study conditions at the time before quarks were bound – the first seconds of the universe. To do this the experiment smashes nuclei together in a particle collider. The nucleons move at energies this high, particles and nuclei go flying, but the complex structure remains intact.

By analysing the particles that emerge at the end of each experiment, scientists hope to learn about the universe.

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Light-bulb moment so rewarding

HEATHER KENNEDY

WORKING with students and their parents to forge a strong partnership is crucial for educators to foster the best outcome for children, a primary teacher says.

Kapunda Primary Year 6/7 teacher Trudy Conway said while teaching came with a lot of responsibility, being an integral part of children’s development and supporting them made it a rewarding career choice.

The 42-year-old is a regional winner in the The Advertiser-State Government SA Public Teaching Awards.

“Being a teacher means that we take the time to consider how best to teach our students and work together in partnership with the student and parents to help each child on their learning journey,” she said.

Ms Conway said her ability to build confidence in her students and to understand their different needs throughout the course of her 21 years of teaching may have contributed to her awards nomination.

“I was quite excited to be nominated,” she said.

“I’ve always loved school, I had wonderful teachers throughout my schooling and I think that is why I’ve never left.

I enjoy teaching and supporting students, and I continue to set challenges for myself to improve my own teaching and ways to support all students.”

Ms Conway said having students recognise the potential of what they can achieve, and that they play the biggest role in their successes, was extremely satisfying.

“It is so rewarding to see the light bulb go on for students when they finally understand a concept that they have struggled with,” she said.

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Published by The Advertiser Newspapers, 31 Waymouth St, Adelaide, SA 5000. GPO Box 339 Adelaide, SA 5001.

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