Will new physics sail on gravitational waves?

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The discovery of primordial ripples in space-time is exciting. But does it really herald a new era for cosmology?

A SIGNAL from the beginning of the universe, detected at the end of the Earth. To find the faint marks left by gravitational waves on the big bang's afterglow, physicists had to hunker down at the South Pole; one heroic researcher endured three harsh Antarctic winters in succession.

The BICEP2 team's efforts were rewarded this week, when they announced to mass acclamation that they had indeed found those marks. Their finding supports inflation – the idea that the universe "boomed" briefly in its infancy – which in turn hints that our universe may be only one of many (see "Multiverse gets real with glimpse of big bang ripples"). It is a champagne moment for physicists, made all the sweeter because many felt it would never come.

Should we all drink to their triumph? It somewhat resembles the discovery of the Higgs boson in 2012. In both cases, the researchers knew what they were looking for, guided by precise theory and earlier results. While the Higgs result was a triumph for the particle's discoverers, it mostly confirmed what we already knew, providing little food for future thought.

Will this latest finding fall similarly flat? Certainly, once the brouhaha has died down we will probably find that it hasn't moved us on terribly far – particularly as long as it remains unconfirmed by other experimenters.

But there are good reasons to expect the indecision to clear up soon. The reported signal is surprisingly strong, meaning telescopes in Chile and Antarctica should be able to quickly verify or refute the result. The Planck satellite, which has measured temperature differences across the sky in unprecedented detail, will also play a vital role.

The theoreticians will be busy, too. Unlike the Higgs result, this one opens up many possibilities, so in the coming days and weeks, we can expect a deluge of papers chewing over the results from BICEP2 and its rivals. Modelling inflation is a bit like playing whack-a-mole; while the new result will knock some out, more will pop up to take their

place. And there are deeper questions. Why did inflation happen at all, and what is behind it? What does it mean for the fate of our universe – and of others?

What will it take to answer these? The story of a lowly Swiss patent clerk called Einstein has seduced us into thinking major advances in physics need genius. And so they do: inflation was an idea born of genius, sorely lacking evidence. But it takes discoveries, too: the kinds of discoveries that can only be made by those willing to go to the ends of the Earth for them. Their efforts rightly deserve applause.

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