

atmosphere provides a great view of deep space.

## SIGNAL IN THE SKY

From 2010 through 2012, the telescope observed a single patch of sky. BICEP2 needed to collect a lot of light, because the swirling pattern that Kovac and his colleagues were searching for was so hard to detect. After three years, they saw it. The swirls in the CMB looked like a smoking gun for inflation—a perfect match for what theorists had predicted.

For over a year, while analyzing and checking their data, BICEP2 scientists kept their findings secret. Once they were satisfied with the results, Kovac wanted Alan Guth to be among the first to know. This past March, he snuck up a back stairway to Guth's office

at MIT, and the pair reviewed the evidence together. "I was stunned," Guth says, "just blown over."

A week later, Kovac and the BICEP2 team shared their results with the world. Several groups of astronomers are now working to check the discovery.

One question they must address is whether anything other than inflation could have caused the swirling pattern. For example, dust in the Milky Way may have interfered with the results. Other telescope observations could soon provide an answer.



## CORE QUESTION

John Kovac was in high school when he became interested in studying the origin of the universe. What has he recently observed? Why is further study needed?



Scientists are already thinking about what the new data might mean for their theories (see *Many Universes?*, below). For instance, there are different ideas about how inflation happened. If confirmed, the BICEP2 results could help rule out some of those options.

It's an exciting time to look out at the universe around us, says Kovac: "We don't know where the frontiers are going to take us next—what we might learn by building machines, pointing them at the sky, and asking bold questions." ❀

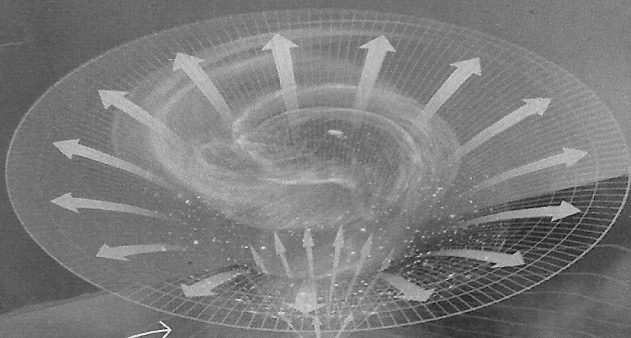
—Jennifer Barone

# MANY UNIVERSES?

It's a wild-sounding idea, but some scientists theorize that our universe may not be the only one. It might be just a small part of an even larger structure called the *multiverse*, where new universes are born all the time.

Inflation theory suggests that the multiverse could be real. Telescope observations that support inflation could mean it's time to take the idea of a multiverse seriously. For now, though, there's no way to test whether it exists, and scientists don't know whether it will ever be possible to find out.

No one knows what the ultimate fate of our universe will be, billions of years in the future. It might continue expanding forever. It might reverse course and start to shrink, an option called the *big crunch*. Or it might expand so rapidly that it someday gets torn to shreds—a possibility known as the *big rip*.



### EXPANDING UNIVERSE:

The universe shown here, pictured in an illustration of the multiverse, is expanding, much like our own.

### SHRINKING UNIVERSE:

This hypothetical universe has expanded and then contracted again.

