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11 for '13: Bhaskar Dutta and David Toback believe we will soon identify “dark” matter

By [Eric Berger](#) on December 26, 2012 at 8:00 AM



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On the cusp of 2013, I've invited 11 of the greater Houston area's top minds to write about something they believe, but cannot prove. A new entry in the 11 for '13 series will be published each morning during the holidays.

Today's mini essay comes from [Bhaskar Dutta](#), and [David Toback](#), physicists at Texas A&M University...

For nearly a century, astronomers have studied a mysterious substance that appears to fill our universe and that we ignorantly refer to as dark matter. One of the reasons we believe this substance exists is that when we study galaxies, the stars in the galaxies move as if only ~10% of the mass in the galaxy is located in the stars. Indeed, the name “dark matter” reflects our belief that this matter exists, but we can't see it.

For more than a century, particle physicists have shown that the things we know and love, like the Earth, the Sun, and your body, are made of atoms which are, in turn, made of fundamental particles known as electrons and quarks (protons and neutrons are made of both up and down quarks). Discoveries of the top quark at Fermilab (in the mid 1990s) and the Higgs Boson at the Large Hadron Collider (LHC) earlier this year have strengthened our belief that there are undiscovered particles out there to be discovered,

and that the dark matter out there may just be vast quantities of what we call dark matter particles.

Dutta (left) and Toback (seated) celebrate the launch of the Large Hadron Collider.

Cosmologists, who study the origin and evolution of our universe, believe that these dark matter particles, like the quarks and electrons in our bodies, must have been created at some point in the history of our universe. If the Big Bang Theory is correct, the cold, vast place our universe is today must have started as a tiny and very hot place more than 13 billion years ago with lots of fundamental particles bashing into each other. The dark matter particles would have been produced in these high-energy collisions a trillionth of a second after the Big Bang, and they are still around today making galaxies spin.

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Many of us believe that the high-energy collisions at the LHC, which recreate the conditions right after the Big Bang, will create dark matter particles that can then be observed in our giant particle detectors if we know exactly how to look. Because knowing where to look and actually doing the looking is a monumental task, astronomers, particle physicists and cosmologists have come together recently at the Mitchell Institute for Fundamental Physics and Astronomy at Texas A&M University to help focus the efforts. We may well be on the verge of solving the “dark matter in our universe” question, one of the greatest mysteries in all of science.

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