New website dedicated to discussion of string theory

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Illustration of a black hole with accretion lines. Credit: NASA

(Phys.org)—Look hard enough, string theory says, and at a scale so small that atoms loom as large as entire continents do to us you would see that every particle in the universe is just the product of vibrating strings.

It's a powerful idea that could help to explain everything from black holes to hidden dimensions, and lead to a new understanding of gravity.

But string theory is also enigmatic and baffling, describing a realm that is, with current technology, too small for us to explore directly.

A new website, Why String Theory?, aims to tell the story of the theory's past, present, and (possible) future in a way that anyone can understand.

'We all instinctively want to explore the world around us. String theory gives us a chance to uncover the most fundamental laws of nature. So much of fundamental physics nowadays is completely inaccessible… We wanted to rectify this, conveying the excitement of contemporary research,' Edward Hughes, a Cambridge University undergraduate and member of the team behind the website, tells me.

'I'm still on the fence as to whether I think string theory is the right direction, but there are certainly elements of it that are very simple and appealing,' says team member Charlotte Mason, an Oxford University undergraduate. 'The idea that the myriad of particles in the universe could arise from different vibrational patterns of tiny strings is a very elegant explanation. Though the mathematics beyond that is often not so elegant!'

Joseph Conlon of Oxford University, another member of the team, explains that part of the theory's appeal lies in 'string miracles', these are 'calculations that look like they are going to fail and show that the theory is inconsistent, but then something comes in and suddenly saves the day. Once you see this happening several times you realise that the theory has a very deep structure and your understanding of it only scratches the surface.'

String theory is not the only approach that it is hoped might one day encompass the behaviour of everything from galaxies to sub-atomic particles, but it does appear to offer some tantalising insights. One of these concerns some of the universe's most mysterious objects: black holes.

'Objects in string theory called branes can be used to count the number of possible ways you can make a black hole,' Joseph tells me. 'For certain types of black holes this agrees with a famous calculation of Stephen Hawking of the entropy of the black hole.

'Entropy is a measure of how many ways there is of making something. Hawking used clever arguments to say what the answer must be. In string theory you can count the number of ways explicitly and find that it agrees with Hawking's answer.

'String theory can help solve problems with quantising gravity by treating particles as strings rather than points. This smears out interactions and makes infinite quantities finite.'

But, however powerful its insights, there is a problem: so far no one has been able to prove that those tiny vibrating strings the theory depends on actually exist. Joseph admits that they will be hard to find: it will, he thinks, take a major technological advance, a brilliant insight, or wonderful luck to turn up the right kind of evidence.

Yet string theory has a habit of turning up surprises, as Joseph says: 'Working on it is also good for humility, you are perennially aware that the theory is smarter than you.'

Provided by Oxford University

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