

Jumping into the quantum whirlpool

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A University of Queensland quantum physicist is applying a new theory to an old problem.

Dr Matthew Davis, from UQ's School of Physical Sciences, is working on a new state of matter – a Bose-Einstein condensate - to further understand the very nature of the universe.

“The beauty of a Bose-Einstein condensate is that it is similar to a laser but made of matter,” Dr Davis said.

“It is a collection of atoms that are perfectly coherent and have the potential to be used in ultra-sensitive measurement devices.”

Dr Davis said BECs were first predicted in the 1920s by Einstein, but not realised in the laboratory until 1995.

His own particular interest is looking at how the BECs form and especially how quantum whirlpools, called vortices, are formed.

“The theory I have developed explains the experiments quite well, so now we can use it to investigate possible other experiments computationally, such as looking at creating persistent currents in Bose-Einstein condensates that are analogous to supercurrents in superconductors that never decay,” he said.

“This will hopefully answer broader questions about the nature of certain types of phase transitions, and will feed into experiments being

performed by my collaborators at the University of Arizona,” he said.

Source: UQ

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