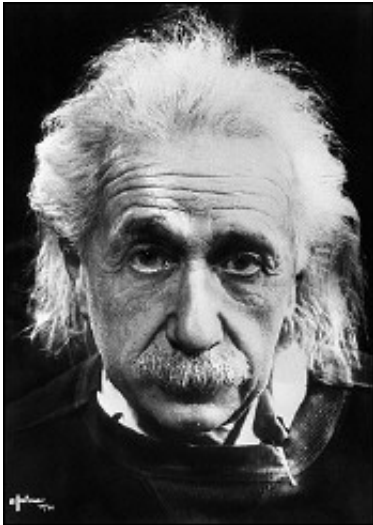


# Researchers extend Einstein's work

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A University of Queensland research team has celebrated the end of the Einstein International Year of Physics by developing a ground-breaking theory based on work originated by the great scientist.

The theory was developed by physicists Dr Karen Kheruntsyan, Dr Murray Olsen and Professor Peter Drummond at the UQ node of the Australian Research Council Centre of Excellence for Quantum-Atom Optics (ACQAO).

Dr Kheruntsyan said the world-first theory combined two of Einstein's many outstanding contributions to science – the Einstein-Podolsky-

Rosen (EPR) paradox and Bose-Einstein condensation.

“The original EPR work was undertaken by Albert Einstein in the 1930s and questioned the basis of what is today known as quantum mechanics,” Dr Kheruntsyan said.

“Einstein was never happy with certain aspects of quantum mechanics and the EPR paradox has been one of the most puzzling physics problems for the past 80 years. The essence of the paradox is that it suggested that classical concepts of physical reality were not applicable in the quantum domain.

“The new work represents a break-through in this area of theoretical science and could have major applications in many areas, particularly new gravity sensors.”

Dr Kheruntsyan said the theory extended pioneering work carried out by Reid and Drummond in the late 1980s, which demonstrated how to perform the famous EPR thought experiments using photons (light).

“The new technology of Bose-Einstein condensates and atom lasers available today has enabled us to extend this work even further and we have now been able to propose a demonstration of the EPR paradox using ultra-cold atoms.

“Unlike the earlier work with photons, atoms feel the force of gravity and these new techniques will open up a whole new field for testing quantum mechanics in future,” Dr Kheruntsyan said.

A paper on the new theory “Einstein-Podolsky-Rosen correlations via dissociation of a molecular Bose-Einstein condensate” was published in the October issue of the world's most prestigious journal, the *Physics Review Letters*.

ACQAO undertakes research which is carried out at three Australian universities: The University of Queensland, the Australian National University and Swinburne University of Technology.

See also: [www.physorg.com/news139.html](http://www.physorg.com/news139.html)

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