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Quantum trick to improve the detection of gravitationnal waves

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The first gravitational waves signal was detected on the 14th september 2015 by the LIGO observatories. Since then many other detections have been made and especially in August 2017 with the detection in coincidence on both LIGO and Virgo detectors of the coalescence of two neutron stars which position in the sky was precise enough to identify the galaxy host and electromagnetic counterpart.

With this in prospect, it is important to enhance the sensitivity of gravitational waves detectors. Frequency dependent squeezing is a promising improvement which uses the rules of quantum optics to go beyond the standard quantum limit of gravitational waves detector sensitivity. I will present this technique within the framework of an experimental prototype under installation in the CALVA 50 meters cavity at LAL to test its implementation in a detector such as Advanced Virgo.

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