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Quantum noise in the NextG of GW detectors and how to suppress it.

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It is hard to overestimate the scientific significance of the 6 confirmed detections of gravitational waves from compact binary sources that Advanced LIGO and Advanced Virgo have jointly made. However, it is still a long way ahead until the sensitivity of GW detectors is high enough to make them fully fledged astronomical tools. The main hindrance on this way remains the quantum noise, the fluctuations of light phase and amplitude stemming from the very foundations of Quantum Mechanics that will be soon limiting the existing instruments in almost entire frequency band above 30 Hz. In this talk, I will try to give an outlook at known avenues and trails towards the desired 10-fold quantum noise suppression benchmark set by the design goals of the NextG GW interferometers. The main methods of increasing the signal-to-noise ratio of GWDs by means of advanced quantum measurement techniques will be reviewed.

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