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Results of the first injection of FIS in Advanced Virgo

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Second generation gravitational-wave (GW) detectors are mainly limited by quantum noise, produced by vacuum fluctuations entering the interferometer from the dark port. Vacuum fluctuations have equal uncertainty in phase, associated to shot noise which limits the sensitivity at high-frequencies and amplitude, associated to radiation pressure noise which limits the sensitivity at low-frequencies. The injection of a squeezed vacuum from the dark port has been proposed as a strategy to decrease quantum noise without modifying the configuration of the interferometer. In a squeezed vacuum state, amplitude and phase uncertainties are modified: one is reduced at the expense of the other, originating the squeezing ellipse. Since phase and amplitude uncertainties depend on the frequency, the injection of a frequency independent squeezed (FIS) vacuum state mitigates quantum noise only where the GW signal is aligned with the reduced uncertainty.

In this talk, the first results obtained injecting a FIS vacuum state in Advanced Virgo will be presented.

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Session Classification: R&D and new technologies