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## Mode matching for the next generation of Gravitational Wave detectors

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The Laser Interferometer Gravitational-wave Observatory (LIGO) and Virgo have recently opened a new window for astronomy by detecting gravitational-waves from coalescing black holes and from neutron star merger. The LIGO/Virgo Scientific Collaboration is exploring ways to increase range and sensitivity by applying promising new techniques for current and next generation gravitational-wave detectors.

One is the squeezed light technology, which will reduce quantum noise that is the ultimate limiting noise source for gravitational wave detectors.

The achievement will be possible only when the interferometer presents low losses for the laser light. Mode mismatch between optical cavities in LIGO cause losses that limit the potential benefit of future upgrades like squeezing. An adaptive mode matching system is needed to provide better than 98% mode matching and thus the best conditions for squeezed light technologies to operate in. Here the analysis of mode mismatch and future strategy will be presented.

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