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Birefringence characterisation of KAGRA ITMs and simulation with FINESSE

KAGRA is a cryogenic detector using sapphire mirrors as its test masses. The sapphire material was chosen mainly for its high thermal conductivity, low absorption and high transmittance of the 1064 nm laser. However, sapphire has a few disadvantages like birefringence. During the commissioning, we found out the interferometer had unexplained optical losses and beam distortions due to the birefringence effect from two input test masses. These issues degrade the detector controllability and sensitivity to the astronomical gravitational waves. In this talk, we would like to update our birefringence characterisation of KAGRA input test masses. We also proposed a method to model the impact of birefringence effect to the interferometer using the simulation software FINESSE.

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