

# GEO 600 beam splitter Thermal Compensation System: Status and Commissioning

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In the GEO600, the beam splitter (BS) experiences a strong thermal lensing effect due to the high power build-up in the Power Recycling Cavity (PRC) combined with a tiny beam waist. This leads to the conversion of the fundamental mode into higher order modes (HOMs), which negatively impacts the detector performance. To overcome this problem, GEO 600 is equipped with a Thermal Compensation System (TCS) applied to the beam splitter. The TCS involves projecting a spatially tunable heating pattern through an optical system onto the beam splitter to correct the thermal lens and bring the detector back to its ideal operating state. This poster aims to discuss the current status and commissioning of the GEO 600 beam splitter thermal compensation system. We will present recent results highlighting the performance achieved, particularly the effect on strain sensitivity, as well as the planned next upgrade to further enhance TCS performance and mitigate power-up challenges.

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