

# Updated study of scattered light and baffle design in the main arms of the Einstein Telescope gravitational wave detector

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We present an updated estimation of the noise induced by scattered light inside the main arms of the Einstein Telescope (ET) gravitational wave detector. Both ET configurations for high- and low-frequency interferometers are considered, for which we propose baffle layouts and designs. The noise estimations are done using both numerical tools and analytical formulas. For the baseline configuration and nominal operations, we conclude that the scattered light noise can be maintained at acceptable levels such that it does not compromise the ET performance, provided some requirements are met. We additionally simulate the effect of the presence of a beam misalignment, of point defects and an off-axis beam, recasting the results into upper limits of these non-idealities of the cavity. We also show a first study of baffle vibrations, concluding that the resonances of the mechanical coupling with the tube do not compromise the scattered light noise.

**Primary author:** ANDRÉS-CARCASONA, Marc (IFAE)

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