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PhaseTrace – Towards a user friendly scattered light simulation

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The problem of back-scattered light is a major issue at low frequencies and must be tackled to make ET sensitive down to 2 Hz. Back-scatter arises as DC light, either by well-defined light paths due to the design of the optics, by diffraction of the tails of these light paths or imperfect surfaces of the test masses. Diverted out of the main modes and scattered back by modulated surfaces, it can re-couple and be detected as light- or phase noise. Mitigating this noise requires suppression of the primary scattering and/or the back scatter mostly by well-designed baffle plates. Although, many effects can be calculated analytically, a detailed simulation is necessary to take all effects properly into account, for example, to avoid that the new baffle plates introduce noise themselves. Currently, there is no free simulation tool available based on modern technologies that offers a simple user-interface allowing application by a variety of end users. PhaseTrace is a design study for such an implementation, which focuses on performance and a broad user interface (C++, ROOT, Python, GUI).

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