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Light-by-light scattering with intact protons at the LHC: from Standard Model to New Physics

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We discuss the discovery potential of light-by-light scattering at the LHC, induced by the SM and by new exotic charged particles. Our simulation relies on intact proton detection in the planned forward detectors of CMS and ATLAS. The full four-photon amplitudes generated by any electrically charged particles of spins $1/2$ and 1 , including the SM processes involving loops of leptons, quarks and W bosons are implemented in the Forward Physics Monte Carlo generator. Our method provides model-independent bounds on massive charged particles, only parametrized by the spin, mass and “effective charge” Q_{eff} of the new particle. We also discuss the sensitivities to neutral particles such as a strongly-interacting heavy dilaton and warped Kaluza-Klein gravitons, whose effects could be discovered for masses in the multi-TeV range.

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