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Preequilibrium dilepton production: concepts, estimates and feasibility

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Early time dynamics of heavy-ion collisions represents an important quest to connect the initial conditions with the hydrodynamic evolution and to understand thermalisation in general. Directly sensitive measurements have remained elusive so far. Electromagnetic radiation is a sensitive probe to study QCD systems throughout the full time evolution including the very early stages. In this contribution, we propose an approach to estimate the production of dilepton pairs from the pre-equilibrium phase of heavy-ion collisions. We are employing a generalization of the thermal dilepton production rates for anisotropic systems, where the pre-equilibrium evolution of the system is described by non-equilibrium attractors that connect the highly anisotropic initial state at early times with the late stage viscous hydrodynamic evolution. Based on this framework, we investigate the sensitivity of the dilepton production yields on the macroscopic features of the pre-equilibrium stage; the required kinematics and open points will be pointed out. Finally, we will address the main background and the measurement feasibility with dimuons at forward rapidity for the future LHCb U2 set-up.

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