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Ultra-bright GeV photon source via controlled electromagnetic cascades in laser-dipole waves ARKADY GONOSKOV, Chalmers University of Technology, Sweden, ALEXEY BASHINOV, EVGENY EFIMENKO, ALEXANDER MURAVIEV, ARKADY KIM, Institute of Applied Physics, RAS, Russia, ANTON ILDERTON, University of Plymouth, UK, SERGEY BASTRAKOV, IOSIF MEYEROV, Lobachevsky State University of Nizhni Novgorod, Russia, MATTIAS MARKLUND, Chalmers University of Technology, Sweden, ALEXANDER SERGEEV, Institute of Applied Physics, RAS, Russia — The prospect of achieving conditions for triggering strong-field QED phenomena at upcoming large-scale laser facilities raises a number of intriguing questions. What kind of new effects and interaction regimes can be accessed by basic QED phenomena? What are the minimal (optimal) requirements to trigger these effects and enter these regimes? How can we, from this, gain new fundamental knowledge or create important applications? The talk will concern the prospects of producing high fluxes of GeV photons by triggering a special type of self-sustaining cascade in the field of several colliding laser pulses that form a dipole wave [Gonoskov *et al.* arXiv:1610.06404 (2016)]. Apart from reaching the highest field strength for a given total power of laser pulses, the dipole wave enables anomalous radiative trapping that favors pair production and high-energy photon generation. An extensive theoretical analysis and 3D QED-PIC simulations indicate that the concept is feasible at upcoming large-scale laser facilities of 10 PW level and can provide an extraordinary intense source of GeV photons for novel experimental studies in nuclear and quark-nuclear physics.

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