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## Production of exotic onium states and atoms in photon-photon collisions at hadron colliders

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The cross sections for the production of different composite hadronic and leptonic objects in photon-photon fusion processes in proton-proton, proton-nucleus, and nucleus-nucleus ultraperipheral collisions at the CERN Large Hadron Collider (LHC) and Future Circular Collider (FCC), as well as in Au-Au collisions at the BNL Relativistic Heavy-Ion Collider (RHIC), are estimated. First, the production of three types of spin-even onium systems are considered: quarkonium (spin-0,2 meson resonances), dihadrons (including pionium, kaonium, protonium, and D-mesonium), leptonium (positronium, dimuonium, and ditauonium) states. Secondly, we discuss the production of charged lepton or meson pairs ( $\gamma \gamma \rightarrow X^+X^-$  with  $X^{\pm} = \ell^{\pm}, \pi^{\pm}, K^{\pm}, \overline{p}$ ) followed by the capture of the negative particle by one of the colliding beam hadrons to form exotic atoms such as muonic, tauonic, pionic, and kaonic hydrogen and its counterparts with lead ions.

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