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Ultraperipheral Pb+Pb reactions at LHC energies EDWIN NORBECK, YASAR ONEL, University of Iowa — The magnetic field midway between two Pb nuclei passing at 20 fm is 2 x 10^{20} gauss at LHC energies (1144 TeV in PbPb center of mass). At these energies the Coulomb field of a passing Pb nucleus can be regarded as a cloud of real photons. The cross sections for $\gamma\gamma$ and γA reactions are huge compared to 7 b for two Pb nuclei actually colliding. The reaction rate is limited by the 323 b cross section for breaking up the Pb nucleus or for the capture by a Pb ion of an e^- from the many e^+ e^- pairs that are formed. These products go down the beam pipe and eventually hit superconducting magnets. The $\gamma\gamma$ reactions can produce particles with mc^2 up to 100 GeV. The γA reactions can produce particles with mc^2 more than 900 GeV. These ultraperipheral reactions are particularly clean. In proton-proton reactions, the reaction between two partons to produce something of interest is accompanied by a large background caused by many other parton-parton reactions. When γA breaks up a Pb nucleus, the transverse energy is small so that the fragments continue in the original beam direction. A single neutron in the original beam direction provides a useful flag that shows that an ultraperipheral reaction has occurred.

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