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Gamma-gamma collider based on European XFEL

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Using Compton scattering of $0.5 \mu\text{m}$ laser photons on existing 17.5 GeV (spent) electron beams from European XFEL one can obtain a gamma-gamma collider with $W < 12 \text{ GeV}$. This energy region is not covered by Super-B collider or LHC (the later due QCD backgrounds). Such a collider will be a nice place for application of modern technologies: powerful lasers, optical cavities, SC linacs and low-emittance electron sources. Physics program: spectroscopy of C^+ resonances in various J^P states ($b\bar{b}$), four quark states, quark molecules and other exotics). Variable circular and linear photon polarization will help to determine quantum numbers. Using a large distance between the interaction and the conversion point, it is possible to obtain quasi-monochromatic collisions and thus to measure the total gamma-gamma section in the region below 12 GeV with a high accuracy. Variable photon polarization allows you to measure separately polarization components of the cross section ($\sigma_{\text{perp}}, \sigma_{\text{paral}}, \sigma_0, \sigma_2$).

Summary

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