

## A $\gamma$ - $\gamma$ collider Based Higgs Factory Driven by Energy Recovery Linacs

A  $\gamma$ - $\gamma$  collider has long been considered an option for a Higgs Factory. Such colliders rely on Compton back-scattering for generating  $\gamma$  photons. The present proposals all choose a thick laser target for scattering. In this paper, we present a new approach for a  $\gamma$ - $\gamma$  collider utilizing a thin laser target and energy recovery linac for driving the electron beam. This new concept eliminates useless soft  $\gamma$  photons from multiple Compton scatterings. It also relaxes the requirement of an ultra-high peak power of the laser. A high integrated luminosity can be achieved through high bunch repetition rate and high average current of the electron beam enabled by energy recovery. Further, multi-pass recirculating linac could greatly reduce the linac cost. A preliminary conceptual design of ERL is also discussed.

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