Design of Laser-hybrid Accelerator for Radiobiological Applications (LhARA)

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The Laser-hybrid Accelerator for Radiobiological Applications (LhARA) is proposed as a uniquely flexible facility for radiobiology studies. The technologies developed for and demonstrated by LhARA will have the potential to be used in future hadron therapy facilities. As a laser-hybrid accelerator system, LhARA will use a laser driven beam to generate a large flux of protons or light ions. These particles will be captured by strong-focusing plasma (Gabor) lenses and formed into a beam which allows for the exploration of new regimes in radiobiological studies.

The development of LhARA will take place in two stages. The first stage consists of the capture, focusing, and transportation of proton beams with energies between 10 MeV to 15 MeV using Gabor lenses, quadrupoles and bending magnets for in-vitro experiments. The second stage will accelerate ion beams in a fixed-field accelerator (FFA) to obtain proton beam energies up to 125 MeV, or ion beams of up to about 30 MeV per nucleon for carbon for in-vitro and in-vivo radiobiology. This talk will present the conceptual design for LhARA.