Since its invention in 1950s by Townes and Schawlow at Bell Labs, the laser using different gain media has been developed to operate in a wide wavelength range from infrared to visible to ultra-violet, and more recently, in the x-ray region with Free-Electron Lasers (FELs). However, the development of a laser to produce even higher energy photons, the gamma-rays, has not been fruitful. Since 1960s, a different mechanism, Compton backscattering of a photon beam and an electron beam, has been successfully developed to produce laser-like gamma-ray beams, which are nearly monochromatic pencil beams with a high degree of polarization. In this talk, I will present our research and development program at the High Intensity Gamma-ray Source (HIGS) located at Duke University. Driven by a storage ring based FEL, the HIGS facility is world's most powerful Compton gamma-ray source, producing gamma-ray beams in a wide energy range from 1 to 100 MeV, with changeable polarizations (linear and circular) and a maximum intensity of more than 1E10 gamma/second (around 10 MeV). With these outstanding capabilities, the HIGS facility is a premier gamma-ray photon source for frontier scientific research and industrial applications.