The High Intensity Gamma-ray Source (HIGS) at Triangle Universities

The High Intensity Gamma-ray Source (HIGS) at Triangle Universities is the world's most intense Compton gamma-ray source in the energy range from 1 to 100 MeV. Driven by a powerful storage ring FEL, the HIGS produces exceptionally high intensity, polarized gamma-ray beams with a maximum total flux more than $2 \times 10^{10}$ g/s and a spectral flux of more than $1 \times 10^{3}$ g/s/eV (with a 5% FWHM energy resolution) around 10 MeV.

In the recent years, the polarized, high-brightness gamma-ray beam at the HIGS has been used by a large number of researchers in the US and around the world to conduct a wide range of research in nuclear physics and astrophysics.

In this talk, we will describe the present gamma-ray capabilities of the HIGS, including new capabilities enabled by a recently completed FEL wiggler switchyward project. We will also outline the future development and upgrade projects at the HIGS facility on the energy front and intensity front.

The future upgrade of the HIGS will extend its high-energy operation to about 158 MeV to enable photo-pion physics research. The development of a next-generation gamma-ray source at the HIGS facility will produce gamma-ray beams with unprecedented brightness or the spectral flux in the 2 to 12 MeV region.

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