

X-Ray and Terahertz Source Based on Energy Recovery Linac.

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This research study introduces an innovative design concept named BriXSinO, which aims to generate high repetition rate THz and X-ray synchronized radiation pulses. The proposed BriXSinO system incorporates an Energy Recovery Linac (ERL) based on Superconducting cavities (SC), operating in Continuous Wave mode (CW), and remarkably sustaining MW-class beam power with only 100 kW active power dissipation. The ERL effectively drives a Free-Electron Laser (FEL) Oscillator and an Inverse Compton scattering (ICS) source, both of which are extensively evaluated for their performance in single and dual-color operation scenarios. Through meticulous start-to-end simulations, the scheme's capabilities are thoroughly assessed, particularly focusing on wavelengths of interest within the 10-50 μm (6-30 THz) and 3-0.05 A range. The significant implications of these findings lie in the advancement of medical applications and cutting-edge applied research.