

12th February 2013 - 16:00 Building 99, room IV – O1.111

William S. Graves

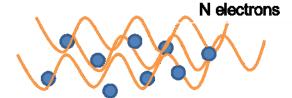
Massachusetts Institute of Technology

High brilliance X-rays from compact sources

The performance of compact x-ray sources based on Inverse Compton Scattering (ICS) is expected to be a million times brighter than existing lab-based sources, approaching that of first generation synchrotrons, but with femtosecond pulse duration. This x-ray performance will be reviewed, and innovative technical approaches using both a 4K superconducting linac and a high efficiency copper linac will be discussed.

In addition a novel method of coherent x-ray emission from a nanostructured electron beam will be presented. If successful, it will allow production of intense coherent ultrashort x-ray pulses from a small accelerator. Conventional ICS scattering produces incoherent x-rays due to physics similar to undulator emission. The new method promises to increase the x-ray intensity and narrow the bandwidth by orders of magnitude, similar to the performance gain that an xfel enjoys over spontaneous undulator emission.

Coherent Inverse Compton Scattering



ICS or undulator emission is incoherent and scales as N



Super-radiant in-phase emission scales as N²