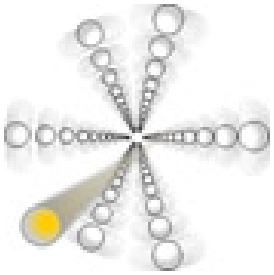

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# Generation and Application of Channeling X-Rays using a Novel Low-Emittance Electron Beam: Plans and Status

*Wednesday, 26 September 2012 09:00 (25 minutes)*

We have plans to use very low-emittance electron beams to generate channeling x-rays capable of being used for phase-contrast imaging and electron diffraction imaging. We have developed field-emission cathodes made of small needles of diamond with end radii of 10 nm. We have measured emission of 10 μA per tip at modest accelerating fields, and we have fabricated them as single emitters and as arrays. We have run simulations that indicate that the very low emittance can be preserved through an RF gun and accelerator and focused to a 40 nm spot on the crystal target, yielding very high x-ray spectral brilliance. We are planning channeling experiments with these novel cathodes on two accelerators at Fermilab: the High-Brightness Electron Source Laboratory photoinjector and later on the Advanced Superconducting Test Accelerator.

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