

# CENTER FOR BEAM PHYSICS SEMINAR

## "Generation and Applications of Ultra-Short High-Brightness Electron Bunches"

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Albert Ghiorso Conference Room (71-264), LBNL

••• Refreshments served at 10:20 AM •••

Abstract: The goal of the research of the accelerator physics group at Eindhoven University of Technology is to generate high-brightness short-pulse electron bunches and generate radiation from compact devices. For high-brightness electron acceleration, a special 2.5 cell, 3 GHz photo-gun, capable of accelerating electrons to 8 MeV was designed and built. The 3 GHz oscillator has been locked to the femtosecond (Ti:Sapphire) laser used for photoemission, the jitter is less than 25 fs. The bunches have been characterized using different diagnostics, among which electro-optical sampling of the picosecond bunches. Further developments, including hybrid DC-RF and pulsed-DC acceleration will be discussed. On the edge of the absorption bands of the K- and L-shell electrons, Cerenkov radiation in the water window (2.4-4.4 nm) can be produced from 10 MeV electrons. The produced radiation is narrowband, with a high directionality and the wavelength can be chosen by choosing different materials. As such, this source may be useful as a compact source for X-ray microscopy.

Biographical data and research interests: Dr. Brussaard started his studies in 1987 at Virginia Tech majoring in General Engineering. After one year, he moved to Eindhoven University of Technology where he studied Applied Physics. He finished his MS in 1994 in the field of Low-Temperature Plasma Physics on plasma deposition of amorphous silicon solar cells. He completed his Ph.D., also at Eindhoven, on "Remote Arc Generated Plasma in Diatomic Gases" in 1999, after which he spent 6 months at LBNL as a postdoc. After returning to Eindhoven, he has been involved in the development of a high-brightness injector (the subject of this talk) in the accelerator physics group, led by Prof. Marnix van der Wiel. In 2002 he was awarded a fellowship of the Royal Dutch Academy of Sciences (KNAW) and received a permanent position as assistant professor at Eindhoven University.