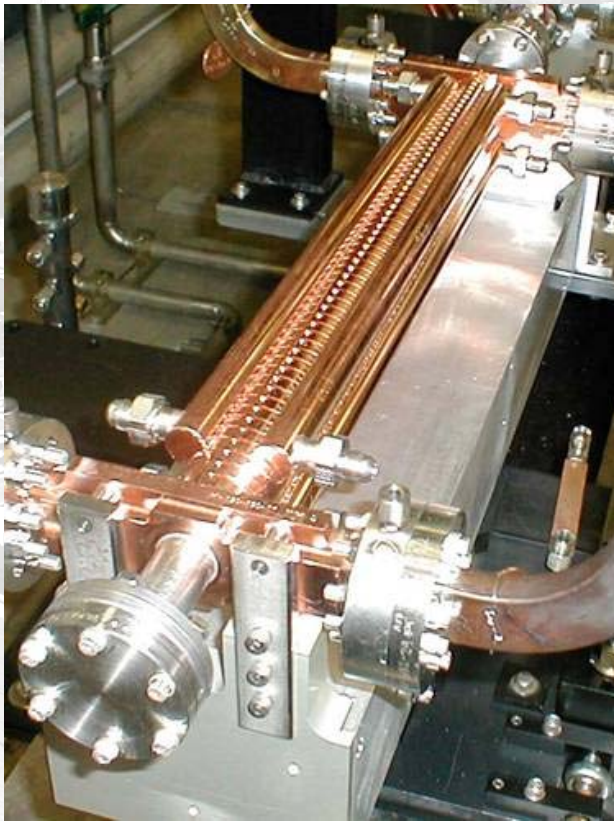


GFA and SwissFEL Accelerator Seminar

A Compact X-band Drive Linac for a Free Electron Laser

Monday, 18 October 2010, 16.00 h, WBGB/019

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A 53 cm long X-band accelerator structure that operates stably at an unloaded gradient of 100 MV/m with 100 ns pulses.

To make future FELs more compact and less expensive, higher-frequency room-temperature drive linacs are being considered, in particular, C-band (5.7 GHz) accelerators with 35 MV/m gradients. In this talk, we show that an X-band (11.4 GHz) linac using the technology developed for NLC/GLC can provide an even more compact solution that is likely less expensive. In this case, stable operation is possible at gradients of at least 70 MV/m for multiple bunches and up to 100 MV/m for single bunches. Although the wakefields in the X-band accelerators will be larger, the use of short, low charge bunches, like those at LCLS, will allow LCLS-like XFEL performance to be achieved with moderate linac alignment tolerances. We first review the X-band technology developed for NLC/GLC and then show an example design of a 6 GeV X-band drive linac that uses existing RF components and would operate at power/gradient levels that have been demonstrated. We also discuss other applications of X-band technology, for which there has been a resurgence of interest in recent years.