

The DESY-ILC '9mA experiment' at FLASH

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The corner stone of the TESLA superconducting linear accelerator technology is the ability to accelerate long bunch-trains at relatively high currents in pulsed operation with low emittance growth and low beam loss. The reference design for the International Linear Collider main linacs uses some 600 10MW klystron that each feed 26 cavities housed in three cryomodules. Two other high level rf configurations are also under consideration, namely the klystron cluster scheme (KCS) and distributed RF scheme (DRFS). We will give an overview of the three systems and consider their relative merits. Beam tests of the baseline rf configuration are the subject of the TTF/FLASH '9mA programme', led by DESY in collaboration with the ILC-GDE, and which has the goal of demonstrating and characterising operation with 800us beam pulses at 9mA average current and at the limits of gradient and rf power. Following a successful demonstration in 2009 of FLASH operation with long pulses and high average current, the programme has shifted to establishing operation close to cavity quench limits under heavy beam loading conditions. With each klystron feeding many cavities, the challenge is to achieve not just a stable vector sum but also stable gradient profiles on individual cavities. We will report on recent activities and discuss plans for future studies.

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