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First Dielectric Wakefield Experiments at Daresbury Laboratory

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First dielectric wakefield acceleration (DWA) experiments have been conducted on CLARA/VELA test facility at Daresbury Laboratory, UK. The DWA structure was of planar geometry with variable gap and dielectric thicknesses ranging from 0.025 to 0.2mm. The facility, in its current state, provided electron bunches with up to 100pC bunch charge, variable 0.2-2.0ps bunch lengths at the beam energy of 35MeV. All major wakefield effects have been demonstrated including energy modulation in longer bunches, energy dechirping, transverse streaking and focussing. With modest bunch charge of ~50pC, a decelerating field of ~8MV/m was measured. Using this variable gap planar structure, we have also demonstrated a continuously tunable narrowband THz generation (details will be given in a separate presentation). Summary of experimental results will be presented along with current status of the CLARA/VELA facility and its near future developments including implementation of the dielectric wakefield dechirper.

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