

Upgrade of the fast analogue intra-pulse phase feedback at SPARC_LAB

Tuesday, October 24, 2023 4:50 PM (30 minutes)

SPARC_LAB is a facility designed for the production of FEL radiation and the exploration of advanced acceleration techniques using a high brightness electron photo-injector. Specifically, particle-driven plasma wakefield acceleration (PWFA) necessitates exceptional beam stability, in order to minimize the jitter between the driver and witness beams. This requirement directly translates into RF phase jitter minimization, since a velocity bunching (RF compression) working point is employed at SPARC_LAB for acceleration. In the past, a fast intra-pulse phase feedback system has been developed to stabilize the klystron RF pulse. This allowed to reach a phase stability of S-band power units (both driven by PFN modulators) below 50 fs rms. However, in order to meet the more stringent requirements of PWFA scheme, some upgrades of this feedback system have been recently carried out. A prototype has been tested on a C-band klystron driven by a solid-state modulator, in order to investigate the possibility for an additional improvement resulting from the inherently more stable power source. In this paper the preliminary measurement results obtained at SPARC_LAB will be reviewed.

Keyword

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Session Classification: Hardware

Track Classification: Hardware