



Contribution ID: 90

Type: **Invited talk**

Electron injector system for AWAKE Run 2

Monday, 19 September 2022 17:50 (20 minutes)

The proton driven plasma Wakefield acceleration experiment AWAKE at CERN demonstrated basic electron capturing and acceleration using a rather long electron bunch spreading out over several plasma wavelengths. For the second phase of the experiment called Run 2, the aim is to inject a short electron bunch with appropriate emittance and charge to achieve full capture and emittance preservation of the injected electron bunch. Therefore, a new electron injector and beam delivery system has been designed to fulfil the requirements. At the plasma entrance a bunch length of 200 fs and a charge of 100 pC is needed, the electron beam has to be focused down to a beam size of 5 μm to realize a complete blow out which enables emittance preservation. The design of the injector consisting of an S-band RF-gun and X-band acceleration and velocity bunching will be presented as well as the design of the transfer line into the plasma. The status of the prototyping work will be discussed as well.

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Session Classification: Special Topic