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Electron-Beam Manipulation Techniques in the SINBAD Linac for External Injection in PWFA

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The SINBAD facility (Short and INnovative Bunches and Accelerators at Desy) is foreseen to host various experiments in the field of production of ultra-short electron bunches and novel high gradient acceleration techniques.

Besides studying novel acceleration techniques aiming to produce high brightness short electron bunches, the ARD group at DESY is working on the design of a conventional RF accelerator that will allow the production of low charge (0.5pC - few pC) ultra-short electron bunches (having FWHM length < 1fs - few fs). The setup will allow the direct experimental comparison of the performance achievable by using different compression techniques (velocity bunching, magnetic compression, hybrid compression scheme). At a later stage ARES will be used to inject such electron bunches into a laser driven Plasma Wake-field Accelerator, which imposes strong requirements on parameters such as the arrival time jitter and the pointing stability of the beam.

In this paper we review the compression techniques feasible at SINBAD and we underline the differences in terms of peak current, beam quality and arrival time stability.

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