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## Time-resolved studies of beam-loading variations at FLASHForward.

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The FLASHForward experimental facility is a test-bed for beam-driven plasma-wakefield (PWFA) research and development, with a view towards both photon-science (e.g. FELs) and high-energy-physics applications (e.g. linear colliders). The facility benefits from the FEL-quality electron bunches provided by the FLASH linac to drive a wakefield in a plasma produced inside a windowless gas cell with lengths of order cm. One of the most recent achievements of the FLASHForward facility has been to demonstrate energy-spread preservation and high energy-transfer efficiency by strongly beam loading the wakefield with tailored-current-profile bunched beams. On the grounds of this success and with the powerful diagnostic capabilities of a novel transverse deflection structure, the dependence of the beam-loading quality on critical machine parameters is further investigated. The results show that the plasma-acceleration process is extremely sensitive to the stability of the bunch compression scheme at the linac, which directly affects the amount of beam-loading through the modification of the current profile of the generated driver-trailing bunch pairs.

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