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Wake fields effects in dielectric capillary

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For plasma wake-field acceleration experiments (PWFA) that are foreseen at the SPARC_LAB test facility, we are going to use a gas-filled capillary plasma source composed of a dielectric capillary where the electron beam has to pass through it in order to achieve higher acceleration energies up to GeV level. In this acceleration scheme, wake fields produced by passing electron beams through dielectric structures can determine a strong beam instability that represents an important hurdle towards the capability to focus the high-current electron beam in the transverse plane. For this reasons, the estimation of the transverse wake-field amplitudes assumes a fundamental role in the implementation of the plasma wake-field acceleration. In this work, it will be presented a study to investigate which parameters affect the wake-field formation inside a cylindrical dielectric structure, both the capillary dimensions and the beam parameters, and it will be produced a quantitative evaluation of the longitudinal and transverse electric fields.

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