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Acceleration and focusing capabilities integrated in a new plasma-based device

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Plasma wakefield acceleration revolutionized the field of particle accelerators by generating gigavolt-per-centimeter fields and paved the way toward the development of compact Free-Electron Lasers.
To achieve such large accelerations in a beam-driven plasma accelerator it is necessary to focus the driver bunch to increase its density and, at the same time, transversely match the witness the plasma wakefield.
Here we show the first results obtained at SPARC_LAB by using a compact composite discharge-capillary device consisting of two active-plasma lenses and a PWFA accelerator module. The results demonstrate that it is possible to integrate several plasma-based devices with the goal to build a very compact accelerator stage.

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