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Adiabatic plasma lens experiments at SPARC

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Plasma lenses in the underdense regime have been shown to give extremely strong linear focusing, with strength proportional to the local plasma ion density. This technique has been proposed as the basis of a scheme for future linear colliders that mitigates the Oide effect through adiabatic focusing. In this scenario the plasma density in the lens is ramped slowly on the scale of betatron motion, to funnel the beam to its final focus while forgiving chromatic aberrations. We present the physics design of an adiabatic plasma lens experiment to be performed at SPARC Lab. We illustrate the self-consistent plasma response and associated beam optics for both symmetric and asymmetric beams in plasma, simulated by QuickPIC using density profiles obtained from experiment. We discuss experimental plans including plasma source development and betatron-radiation-based beam diagnostics.

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