

ATTRACT TWD Symposium: Trends, Wishes and Dreams in Detection and Imaging Technologies



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Adiabatic plasma lenses

This work will be performed in collaboration with UCLA (USA) and HU (Israel).

Summary

One of the key elements of the plasma blowout regime is the strong, linear focusing provided by the ion density. This focusing provides highly effective transverse guiding of beams. One advantage of this focusing is its extraordinary strength, which has led to the underdense plasma lens to be proposed as an element of a plasma based radiation sources. Another advantage of underdense plasma focusing is its flexibility, the extreme strength of the focusing gradient is simply proportional to plasma density, which may be easily changed experimentally.

The adiabatic plasma lens is a potentially transformative technique for advanced radiation sources, and is based on this flexibility, relying on an adiabatic increase in focusing to funnel the beam size down to very small spots. As such, it may be used to mitigate the need for very long beam transport systems.

This idea can be paired with a related concept, that of plasma matching and beam transport between each plasma accelerating module stage, to diminish the ultra-strong beam-plasma transition forces that produce effects that notably damage the quality of the accelerated beam.

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