

## **Ion Beam Transport in Plasmas at Very High Intensities**

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Close to the region where they are accelerated, laser-generated proton beams can reach extremely high intensities compared to what is possible with conventional accelerator technology. If we attempted to propagate a beam at these intensities in a plasma, then our understanding of how it propagates can be considerably different to a more conventional scenario.

A very important factor is the ion stopping power, which is strongly temperature dependent, but only at extremely high temperatures. However once the beam intensity becomes very high, these temperatures are accessible, and thus, as we shall show, the ion stopping becomes automatically mitigated as the beam propagates.

We have examined the onset of this regime and obtained dimensionless metrics for its onset, which agree well with detailed hybrid simulations which support the existence of this regime of ion beam transport.