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## Laser-plasma interaction at near-critical densities

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During the interaction between an intense laser pulse and a plasma medium, energetic particles such as, electrons, protons and ions can be accelerated through various acceleration mechanisms. For electron densities close to critical density ( $n_e \sim n_c$ ), laser-plasma interaction is under explored. Here, it is expected that the laser energy absorbed by the plasma is enhanced due to resonance conditions. Simulations show that this density region can be used for efficient electron and ion acceleration, contrast improvement and pulse shortening.

In order to shed more light into this interaction region, an experiment has been carried out at JETI40, IOQ Jena, where Argon gas jet is used to produce near-critical plasma. The interaction region has been imaged using a 2omega probe beam at 90deg to the propagation direction. As the focused laser pulse propagates towards the high density regions of the gas jet, Raman side scattering has been observed to occur preferentially in the upper part of the interaction region. The corresponding plasma densities are measured using interferometry. As the plasma density increases, Raman side scattering vanishes and laser pulse collapse occurs at the near-critical region followed by filamentation.

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