

The simulation laser wakefield acceleration on SQUID

Osaka University, SANKEN, [Y. J. Gu and T. Hosokai]

Purpose

The purpose of this research is to simulate the stable electron acceleration by laser wakefield in plasmas via shock injection.

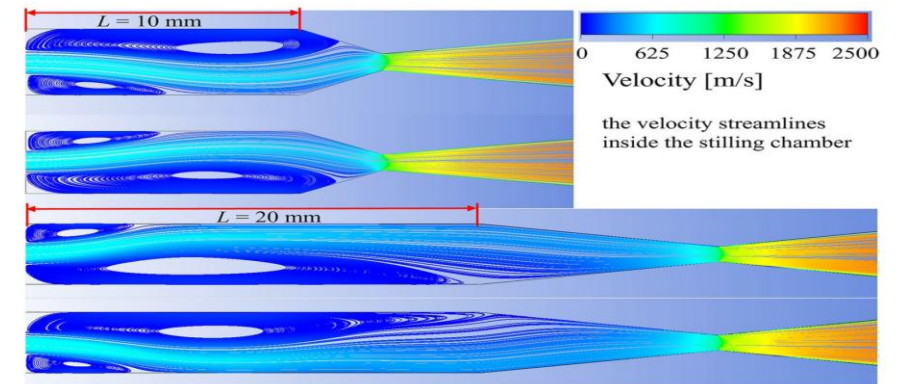
Outline

In the shock injection mechanism of LWFA, the position and the size of the electron injection domain are determined by the shock downramp. To make the accelerated beam controllable and tunable, the relation between the injected beam quality and the shock downramp is investigated by kinetic simulations via the Particle-in-cell (PIC) code.

Result

Due to the sensitivity of the electron injection to the plasma density distribution, the gas density deviations significantly change the accelerated beam quality as presented in the PIC simulations. The CFD results show that the uncertainty and deviation of the gas flow can be successfully suppressed due to the turbulence dissipation inside the stabilizer with a sufficient length.

Computing system:	SQUID General Purpose CPU nodes
node-hour	20,230 node-hour
memory used	100 GB
parallelize	6 nodes



Acknowledged Publication:

Yan-Jun Gu, *et al.*, *Scientific Reports* **14**, 31162 (2024).

The streamlines inside the stilling chamber in the case of $L = 10$ mm, 20mm under the perturbed initial conditions.