AFAD 2018 conference
Jan. 29, 2018, Daejeon

Ion acceleration by shock waves and pulse-recycling TNSA

YoungKuk Kim[1], Teyoun Kang[1], MyungHoon Cho[2], MoonYoun Jung[3], Min Sup Hur[1]

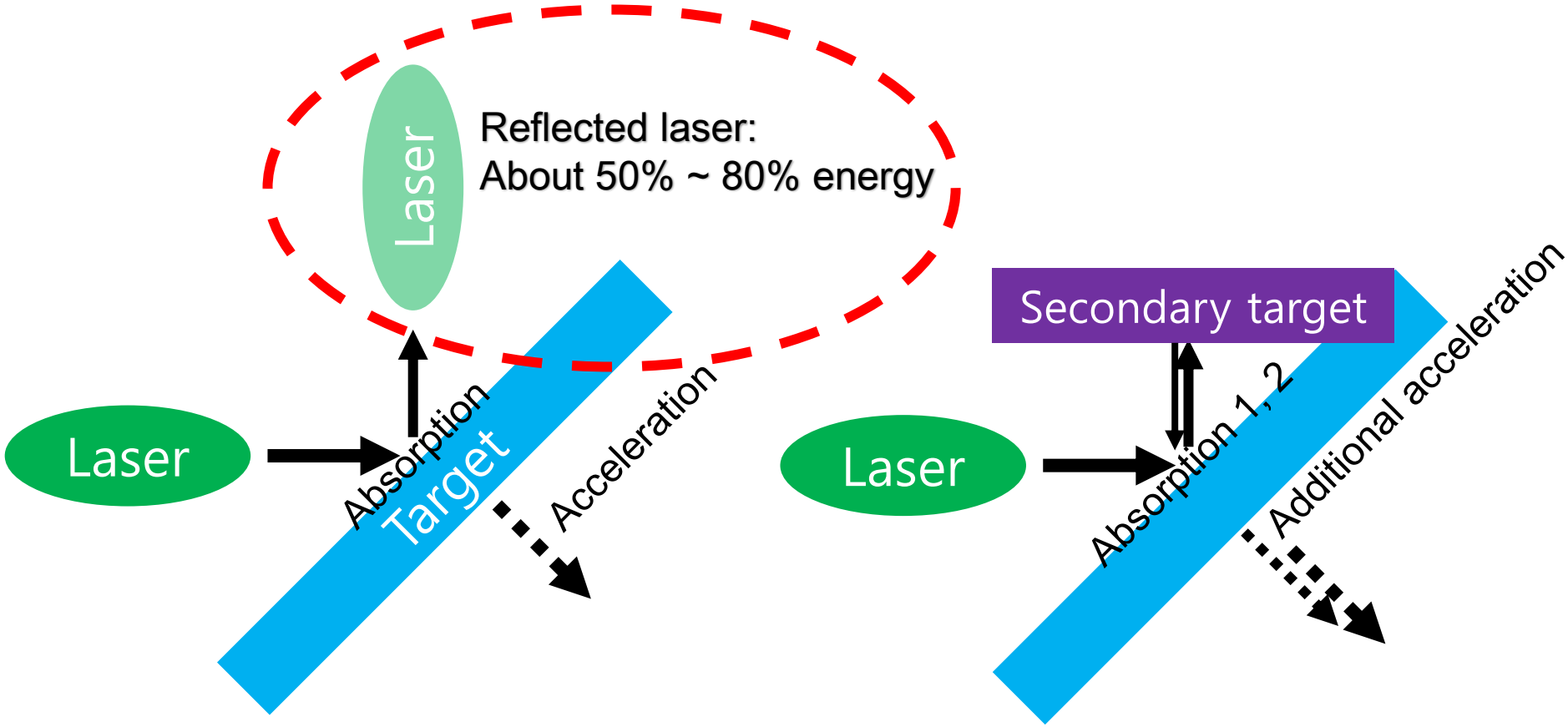
[1] School of Natural Science, Ulsan National Institute of Science and Technology, Korea

[2]Center for Relativistic Laser Science, Institute for Basic Science (IBS), Korea

[3]Bio-Photonics Research Section, Electronics and Telecommunications Research Institute, Korea

Idea

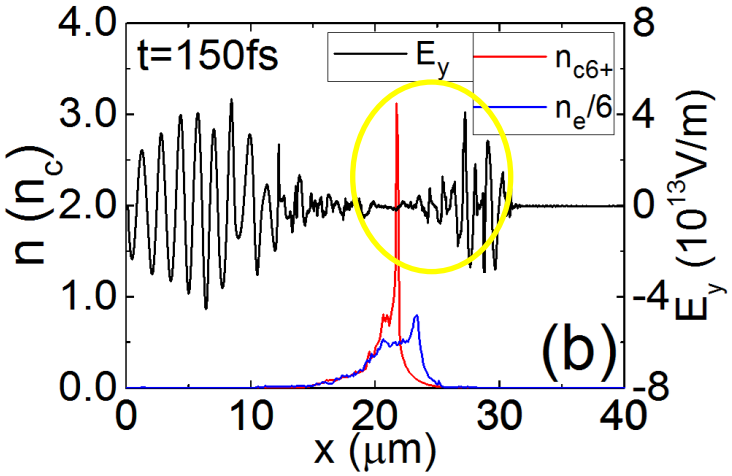
We want to reuse reflected laser pulse.



Relativistic transparency induced shock

1) LP→ **CP** CP pulse piles up higher density spike.

2) Hot electron re-circulation → **R.T**



Background(upstream) electron heats up during the R.T.

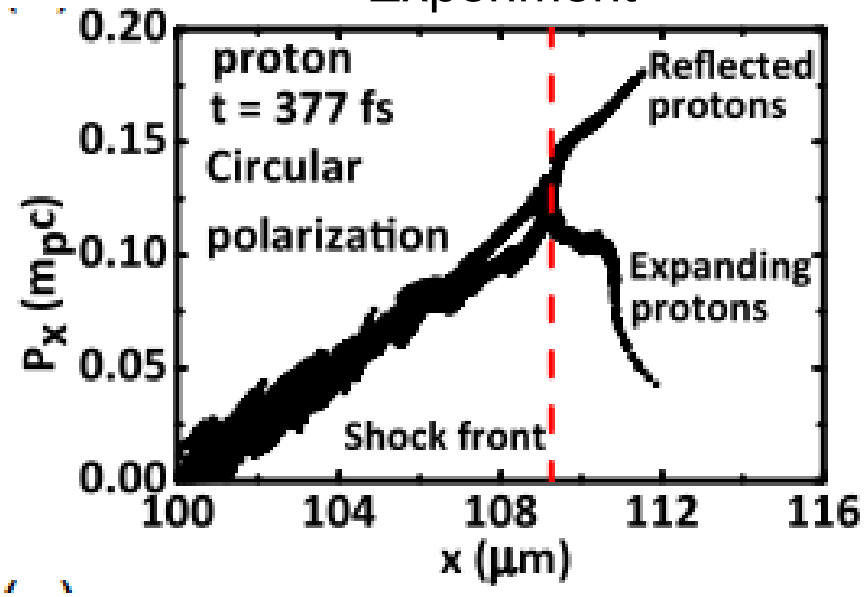
3) Opaque plasmas → **semi-transparent density**

Experiment

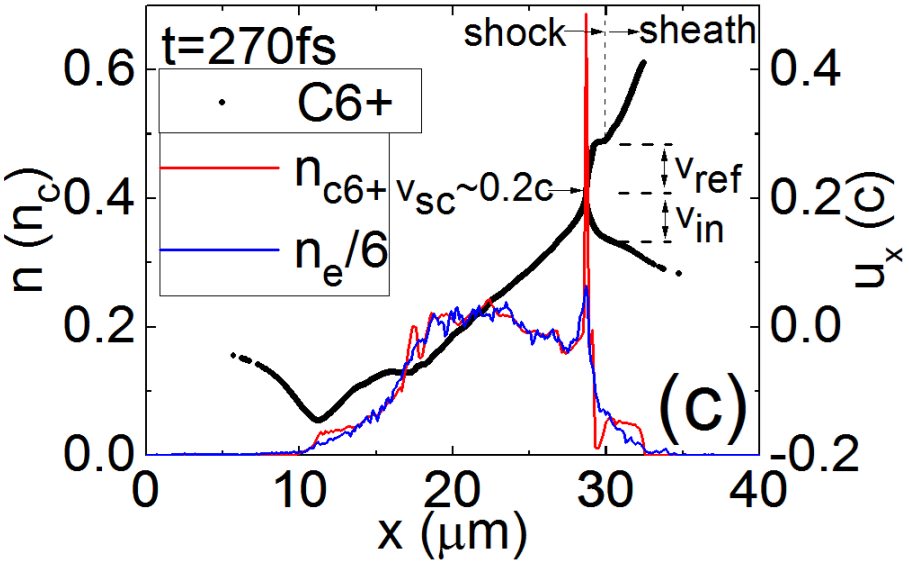
H. Zhang et al., **Collisionless Shock Acceleration** of High-Flux Quasimonoenergetic Proton Beams Driven by **Circularly Polarized** Laser Pulses, PRL 119, 164801 (2017).

Exploded target, CP.

Experiment



PIC simulation



Note: These used different laser and plasma parameters.

Summary

A secondary target is efficient to increase energy, charge, and efficiency. This target is easy to understand and easy to apply to experiment.

CP-driven shock is efficient for ion acceleration due to interaction in low density plasmas.

Y.K. Kim et al., Phys. Rev. E 92, 043102 (2015)
Y.K. Kim et al., Phys. Rev. E 94, 033211 (2016)
Y.K. Kim et al., Phys. Plasmas 24, 073106 (2017)