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[\[Image PDF \(682K\)\]](#) [\[References\]](#)**Proton Generation by Ultra-Short High-Power Laser and the Dependence on Laser Intensity and Pulse Duration**

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Abstract: Energetic protons (~ 1.2 MeV) were generated by irradiation of ultra-short high-power laser pulses onto a $5 \mu\text{m}$ thick copper tape target and the dependence of the proton energies on the laser intensity and pulse duration were investigated. The laser intensity was varied between $8.5 \times 10^{17} \text{ W/cm}^2$ and $6.6 \times 10^{18} \text{ W/cm}^2$, and the pulse duration was varied from 55 fs to 400 fs. The maximum proton energy E_{p_max} and proton temperature were proportional to laser intensity, and they increased with the pulse duration when the laser intensity was kept constant. Thus far, E_{p_max} has been usually scaled as a function of laser intensity, but E_{p_max} depends not only on the laser intensity, but also on the pulse duration in an ultra-short pulse regime such as several tens of femto-seconds.

Key Words: [Ultra-short high-power laser](#), [Particle generation](#), [Laser acceleration](#)

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