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# Transverse emittance of electron beams generated by ionization injection in laser-plasma accelerators

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Ionization injection has become a commonly used technique to trap electrons in plasma wakefields. Ionization injection, where electrons are ionized by an intense laser in the plasma wakefield, reduces the wakefield amplitude required for trapping. The lower trapping threshold allows operation at lower plasma densities, enabling higher beam energy gains. However, ionization injection can also result in poor quality of the trapped electron bunch, compared to self-injection. We examine the transverse emittance of beams generated by laser ionization injection. Methods to improve the beam quality will be discussed. The transverse beam quality may be greatly improved by using two lasers with different wavelengths. This two-color ionization injection technique can generate beams with transverse emittance on the order of tens of nm.

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