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【178】 A polarization-rotating Vivaldi antenna for improved far-field patterns of broadband terahertz quantum cascade lasers

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Terahertz quantum cascade lasers based on double metal waveguides are compact sources of terahertz radiation with excellent properties in terms of covering a large bandwidth and exhibiting low waveguide dispersion. However, as the optical mode is confined to subwavelength dimensions, the emitted radiation produces a highly divergent far-field pattern. We designed and fabricated an antipodal Vivaldi antenna which adiabatically expands the optical mode while rotating its polarization from vertical towards horizontal polarization. Numerical simulations predict a single-lobed far-field pattern with a beam width of less than 20° , spanning over two octaves in frequency (1.5-4.5 THz). Far-field measurements agree well with simulations.

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