L^2 decay estimates for oscillatory integral operators in several variables with homogeneous polynomial phases

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Oscillatory integral operators mapping \( L^2(\mathbb{R}^{n_x}) \) to \( L^2(\mathbb{R}^{n_z}) \) play an important role in many problems in harmonic analysis and partial differential equations. Extending earlier work of Phong and Stein (in the case \( n_x = n_z = 1 \)), we obtain optimal decay rates for the \( L^2 \) operator norm of oscillatory integral operators whose phase functions are generic homogeneous polynomials in \( 2 + 2 \) variables. Some other higher dimensional situations are also addressed, specifically when the polynomial is of sufficiently high degree relative to \( n_x + n_z \). This is joint work with Allan Greenleaf and Wan Tang.

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