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Saugata Basu, Shaoming Guo, Ruixiang Zhang* (ruixiang@berkeley.edu) and **Pavel Zorin-Kranich**. *A stationary set method for estimating oscillatory integrals.*

Given a polynomial P of constant degree in d variables and consider the oscillatory integral

$$I_P = \int_{[0,1]^d} e(P(\xi)) d\xi.$$

Assuming d is also fixed, what is a good upper bound of $|I_P|$? In this talk, I will introduce a “stationary set” method that gives an upper bound with simple geometric meaning. The proof of this bound mainly relies on the theory of o-minimal structures. As an application of our bound, we obtain the sharp convergence exponent in the two dimensional Tarry’s problem for every degree via additional analysis on stationary sets. Consequently, we also prove the sharp $L^\infty \rightarrow L^p$ Fourier extension estimates for every two dimensional Parsell-Vinogradov surface whenever the endpoint of the exponent p is even. This is joint work with Saugata Basu, Shaoming Guo and Pavel Zorin-Kranich. (Received August 25, 2021)