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Highly Oscillatory PDEs.

Abstract: Partial differential equations with highly oscillatory solutions occur in many areas of science like quantum mechanics and acoustics, with important spin-offs to semiconductors, nanotechnology and low-temperature physics.

These equations pose a great challenge to mathematical and numerical analysis. Recently a new mathematical technique has been developed to treat highly oscillatory PDEs, namely Wigner transforms. They allow deep new insights into high-frequency-asymptotics. The state-of-the-art is reported in this lecture, with emphasis on applications like quantum semiconductor and Bose-Einstein condensation.