Classification of Singularities for the Elliptic and Parabolic PDEs and its Measure-theoretical, Topological and Probabilistic Consequences

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The major problem in the Analysis of PDEs is understanding the nature of singularities of solutions to the PDEs reflecting the natural phenomena. In this talk, I will present new criteria for the removability of the fundamental singularity for the elliptic and parabolic PDEs. The criteria characterize the uniqueness of boundary value problems with singular data, reveal the nature of the harmonic or parabolic measure of the singularity point, asymptotic laws for the conditional Markov processes, and criteria for thinness in minimal-fine topology. The talk will be oriented to a general audience including non-expert faculty and graduate students.