

From regularity theory for elliptic equations to invariance principle for random walks

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This talk addresses regularity for elliptic equations under merely averaged ellipticity conditions and establishes sharp criteria ensuring local boundedness and Harnack inequalities. These results extend the classical De Giorgi–Nash–Moser theory and yield new applications to variational integrals with (p, q) -growth. In the second part, the same regularity ideas are applied to the random conductance model, leading—under optimal moment assumptions—to a quenched invariance principle and a local limit theorem. The results highlight a close connection between regularity theory and stochastic homogenization.