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

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I will discuss local regularity properties of solutions of linear non-uniformly elliptic equations with non-constant coefficients. Assuming certain integrability conditions on the ellipticity of the coefficient field, we obtain local boundedness of weak solutions and corresponding Harnack inequality. The assumed integrability assumptions are sharp and improve upon classical work [Trudinger, ARMA 1971]. As applications I will discuss quenched invariance principle for random walks among random degenerate conductances as well as regularity of minimizers for scalar integral functionals with differential (p,q)-growth. This is joint work with Mathias Schäffner (Halle).