Rigidity for actions on Banach spaces and Poincare inequalities

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Abstract: Property (T), defined by Kazhdan, is an extremely useful rigidity property for locally compact groups. It can be expressed as a fixed point property: a group G has property (T) if and only if every affine isometric action of G on a Hilbert space has a fixed point. I will discuss a strengthening of property (T) via a fixed point property for affine isometric actions on Banach spaces and a generalization of the so-called spectral method for proving property (T) to the setting of reflexive Banach spaces. This has several applications, including estimates on the the conformal dimension of the boundary of a random hyperbolic group in the density model, addressing a question of Gromov and Pansu. For such random hyperbolic groups we will also show a vanishing result for cohomology with coefficients in uniformly bounded representations on a Hilbert space, in relation to a conjecture of Shalom.