Regularity preserving perturbations of operator semigroups

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In this talk, we investigate the robustness of ultracontractivity of semigroups under relatively bounded perturbations. Specifically, we consider a C_0-semigroup $(T(t))_{t\geq 0}$ on a Banach space X with a smoothing property of the form

$$T(t)X \subseteq V \quad \text{and} \quad \|T(t)\|_{X\to V} \leq Ct^{-\alpha}, \qquad t \in (0,1];$$

where $\alpha, C > 0$ are constants and V is a subspace of X. Ultracontractivity is a key feature of semigroups arising from diffusion equations and has found recent applications in the theory of *eventually positive semigroups*. Our focus is to identify a class of (unbounded) perturbations B of the generator A such that semigroup generated by $A+B$ retains the smoothing property.

This is joint work with Jonathan Mui (Wuppertal).