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Two new concepts for compact groups: Spectral independence and local randomness

I will explain two new concepts for compact groups mentioned in the title. Their basic properties and their connections with the FAb property, quasi-randomness, and super-approximation will be outlined. I will present how these ideas help us show that a Borel probability measure μ on the product of compact open subgroups of two locally non-isomorphic simple analytic groups has the spectral gap property when its projection to each factor has. (Joint work with Keivan Mallahi-Karai and Amir Mohammadi)