

**Stable solutions to semilinear elliptic equations are
smooth up to dimension 9**

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The regularity of stable solutions to semilinear elliptic PDEs has been studied since the 1970's. In dimensions 10 and higher, there exist stable energy solutions which are singular. In this talk I will describe a recent work in collaboration with Figalli, Ros-Oton, and Serra, where we prove that stable solutions are smooth up to the optimal dimension 9. This answers to an open problem posed by Brezis in the mid-nineties concerning the regularity of extremal solutions to Gelfand-type problems.