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Generic regularity of free boundaries for the obstacle problem in $\mathbb{R}^3$

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Free boundary problems are those described by PDE's that exhibit a priori unknown (free) interfaces or boundaries. The obstacle problem is the most classical and motivating example in the study of free boundary problems. A milestone in this context is the classical work of Caffarelli (Acta Math. 1977), in which he established for the first time the regularity of free boundaries in the obstacle problem, outside a certain set of singular points. A long-standing open question in the field asks to establish generic regularity results in this setting (e.g. to prove that for almost every boundary data there are no singular points). This type of questions arise as well in many other nonlinear PDE's and in Geometric Analysis. The goal of this talk is to present some new results in this context, proving in particular the generic regularity of free boundaries for the obstacle problem in $\mathbb{R}^3$. This is a joint work with J. Serra and A. Figalli.