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Non-Classical Solutions to the *p*-Laplace Equation

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In this talk we will consider the *p*-Laplace equation, $div(|Du|^{p-2}Du) = 0$. In particular, we will focus on very weak solutions, i.e. solutions *u* to the *p*-Laplace equation with $u \in W^{1,q}$, max $\{1, p-1\} < q < p$. In 1994, T. Iwaniec and C. Sbordone showed that if *q* is sufficiently close to *p*, then very weak solutions belong to $W^{1,p}$, and thus are classical solutions. They conjectured the same to happen for any max $\{1, p-1\} < q$. In this talk, I will present a positive result which shows that Iwaniec & Sbordone's conjecture is true if the gradient of *u* belongs to suitable cones, and next I will sketch the construction of a counterexample for this conjecture if this additional condition is not fulfilled. This is based on a joint work with Maria Colombo.