

On degenerate blow-up profiles for nonlinear parabolic equations

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Abstract:

Since the pioneering work of Fujita in 1966, Nonlinear Parabolic equations are known to have finite time blowing up solutions. Given such a solution, the blow-up behavior has attracted a lot of attention since the 1980', with the introduction of the notion of "blow-up profile". In particular, Herrero and Velázquez showed in the early 1990' that the blow-up profile should obey some well-specified set of possible forms, based on Hermite polynomials.

In one space dimension, examples of blow-up solutions for all the possible forms were constructed. In higher space dimensions, apart from some trivial cases coming from the 1-d case, the question remained open so far.

In this talk, we positively answer this question, for a large class of possible forms of blow-up profiles, among them many degenerate cases, which are much harder to handle. In particular, in the Sobolev subcritical range, we construct a solution which blows up in finite time only at the origin, with a completely new blow-up profile, which is cross-shaped. This is a joint work with Frank Merle.