Solutions with time-dependent singular sets for the heat equation with absorption

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Abstract: We consider the heat equation with a superlinear absorption term $\partial_t u - \Delta u = -u^p$ in $\mathbb{R}^n$ and study the existence and nonexistence of nonnegative solutions with an m-dimensional time-dependent singular set, where $n - m \geq 3$. First, we prove that if $p \geq (n-m)/(n-m-2)$, then there is no singular solution. We next prove that, if $1 < p < (n-m)/(n-m-2)$, then there are two types of singular solution. This talk is based on the results of T. and Yamamoto (preprint, arXiv:1712.06065). This is a joint work with Professor Hikaru Yamamoto (Tokyo University of Science).