

# ON A CRITICAL PROBLEM FOR THE HEAT EQUATION WITH THE HARDY TERM

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ABSTRACT. We deal with the existence and nonexistence in the weakest possible sense of positive solutions to the following problem,

$$\begin{cases} u_t - \Delta u &= \lambda \frac{u}{|x|^2} + u^p + f \text{ in } \Omega_T \equiv \Omega \times (0, T), \\ u(x, t) &> 0 \text{ in } \Omega_T, \\ u(x, t) &= 0 \text{ on } \partial\Omega \times (0, T), \\ u(x, 0) &= u_0(x) \text{ if } x \text{ in } \Omega, \end{cases}$$

with  $\Omega$  a domain in  $\mathbb{R}^N$ ,  $N \geq 3$  and  $p > 1$ . Some critical exponents are found.