

## Sharp existence and classification results for nonlinear elliptic equations in $\mathbb{R}^N \setminus \{0\}$ with Hardy potential

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We reveal the structure and asymptotic behavior near zero and infinity of all positive solutions for the nonlinear elliptic equation with Hardy potential  $(\star) -\Delta u - \frac{\lambda}{|x|^2}u + |x|^\theta u^q = 0$  in  $\mathbb{R}^N \setminus \{0\}$  ( $N \geq 3$ ), where  $q > 1$ ,  $\theta \in \mathbb{R}$  and  $\lambda \in \mathbb{R}$  are arbitrary. We provide the sharp range of the parameters such that there exist positive solutions of  $(\star)$  in  $\mathbb{R}^N \setminus \{0\}$ . We show that equation  $(\star)$  has either a unique solution or infinitely many solutions or no positive solutions. This is joint work with Florica Cîrstea. This presentation is partially supported by CNCS-UEFISCDI Grant No. PN-III-P1-1.1-TE-2019-0456.