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The classical Hénon problem consists of finding a solution to

$$-\Delta u = |x|^\alpha u^{q-1} \text{ in } B \subset \mathbb{R}^N, \quad u > 0, \quad (1)$$

with Dirichlet boundary conditions, where B denotes the unit ball in $\mathbb{R}^N$. The motivation in Hénon's original paper was a model of stationary solutions of the nonlinear Poisson equation describing cluster density under gravitational interaction with inhomogeneous distribution. In this direction, it was established later that the weight $|x|^\alpha$ allows for a wider admissible range of exponents for which solutions exist (including the critical Sobolev exponent). In this talk, we will discuss a generalization of the Hénon problem that involves an operator with local and nonlocal contributions in the whole space. This is a joint work with Ariel Salort (Universidad San Pablo-CEU, Madrid).