# TOWERS OF NODAL BUBBLES FOR THE BAHRI-CORON PROBLEM IN PUNCTURED DOMAINS

Let $\Omega$ be a smooth bounded domain in $\mathbb{R}^N$ which contains a ball centered at the origin. Consider problem

$$(0.1) \qquad (\wp_\delta) \qquad \begin{cases} -\Delta u = |u|^{2^*-2}u & \text{in } \Omega_\delta, \\ u = 0 & \text{on } \partial\Omega_\delta, \end{cases}$$

here $N \geq 3$, $2^* = \frac{2N}{N-2}$ is the critical Sobolev exponent and $\Omega_\delta := \{x \in \Omega : |x| > \delta\}$. In this talk we will discuss the existence of nodal solutions $(u_{m,\delta})$ for problem $(\wp_\delta)$. Moreover, if $\Omega$ is starshaped, we show that the solutions $(u_{m,\delta})$ concentrate and blowup at 0, as $\delta \to 0$, and their limit profile is a tower of nodal bubbles, i.e., they are a sum of rescaled nonradial sign-changing solutions to the limit problem

$$(0.2) \qquad (\wp_\delta) \qquad \left\{ -\Delta u = |u|^{2^*-2}u, \quad u \in D^{1,2}(\mathbb{R}^{\mathbb{N}}) \right.$$

centered at the origin.

This is a joint work with M. Clapp and F. Pacella.