

**Elena Beretta** - University of Rome “La Sapienza”, Italy

**An inverse problem arising from magnetohydrodynamics**

Given the semilinear equation  $\Delta u = f(u)$  in  $\Omega$ , where  $\Omega$  is a two-dimensional bounded domain, with  $u = 0$  on  $\partial\Omega$ , we consider the problem of determining the nonlinear term  $f \geq 0$  from knowledge of the normal derivative of  $u$ ,  $\frac{\partial u}{\partial n}$ , on  $\partial\Omega$ . It is easy to see that the identification of  $f$  fails if  $\Omega$  is a ball. We review some uniqueness results for analytic  $f$ 's in classes of non-smooth domains  $\Omega$  and we describe a result of uniqueness in a class of smooth domains  $\Omega$  obtained recently with M. Vogelius and S. Vessella via a regularity result for the (free) boundary  $\partial\Omega$ .