Title: Calibrating fields for a class of non convex variational problems

Abstract: In 2015, I presented a general duality theory for a class of non convex variational problems (G.B, I Fragala, 2016 Arxiv), typically

$$\inf \left\{ \int_\Omega (|\nabla u|^p + g(u))\, dx \quad : \quad u \in W^{1,p}(\Omega)\ ,\ u = u_0 \text{ on } \partial\Omega \right\}$$

where $g : \mathbb{R} \to \mathbb{R} \cup \{+\infty\}$ is a non convex l.s.c function with possibly many jumps. In this talk (joined work with Ilaria Fragala (Politecnico di Milano- Italy) and Minh Phan (IMATH-Toulon)), I will report on two recent related results specific to the case $p = 1$:

- the first one concerns an exclusion principle which states that minimizers take values outside the set $\{g^{**} < g\}$. This principle allows convex relaxation and then we focus on a multiphase problem that we treat numerically by means of a primal-dual algorithm.

- the second one concerns a variant of the Cheeger problem in a convex subset $D \subset \mathbb{R}^2$ for which we construct explicit calibrating fields. This is done by using a locally Lipschiz potential whose trace on ∂D coincides with the normal distance to the cut-locus.