Cheeger partitions: existence results and qualitative properties

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The Cheeger problem consists in determining a set C, contained in a given bounded set Ω, which minimizes the ratio between perimeter and volume. In this talk we will consider the following generalization: for a fixed $k \in \mathbb{N}$, we want to determine k pairwise disjoint sets C_1, ..., C_k, contained in Ω, which minimize the maximum of the quotients perimeter/volume. We will deal, in particular, with existence and regularity results for the clusters, and we will provide explicit examples. The results have been obtained in collaboration with Vladimir Bobkov (Pilsen)