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Peter Elbau* (`peter.elbau@oeaw.ac.at`), Johann Radon Institute for Computational, and Applied Mathematics, Altenbergerstrasse 69, A-4040 Linz, Austria. *Sequential Lower Semi-Continuity of Non-Local Functionals.*

From classical results of the calculus of variations, we know that the sequential lower semi-continuity of a functional \mathcal{J} on $L^p(X)$ of the form $\mathcal{J}(u) = \int_X f(x, u(x))d\mu(x)$ can be directly expressed in terms of the function f . If we were e.g. looking for sequential lower semi-continuity with respect to the weak topology on $L^p(X)$, then f had to be convex in the second argument.

The aim of this talk will be to analyse non-local functionals \mathcal{J} on $L^p(X)$ of the form

$$\mathcal{J}(u) = \int_X \int_X f(x, y, u(x), u(y))d\mu(x)d\mu(y)$$

and see how far these classical results can be generalised. We will mainly focus on the conditions for the functional to be sequentially lower semi-continuous with respect to the weak topology on $L^p(X)$, which will turn out to be that the function f is (up to equivalence) separately convex in the third and fourth argument. (Received September 22, 2009)