In recent years two novel approaches for finding lower bounds on the chromatic number of a graph have been introduced. One involves studying the connectivity of the ‘edge space’ of a graph, dating back to Lovász’s celebrated proof of the Kneser conjecture. The other is motivated by constructions in statistical physics, and involves the notion of the ‘warmth’ of a graph introduced by Brightwell and Winkler.

We seek to relate these two constructions, and in particular we provide evidence for the conjecture that the warmth of a graph $G$ is always less than three plus the connectivity of its edge space. We succeed in establishing the first nontrivial case of the conjecture, and calculate the warmth of a family of graphs with relevant edge space topology. We also demonstrate a connection between the warmth of a graph and the collection of complete bipartite subgraphs that it contains, providing an analogue for a similar result in the context of edge spaces. This is joint work with Ragnar Freij. (Received February 24, 2015)