Superinsulation: theory and applications

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Abstract

Superinsulators are the mirror-twins of superconductors. Their resistance is infinite below a finite critical temperature and voltage. As such they perfectly hold charge, exactly as superconductors perfectly hold currents, which opens the way for many new technological applications (if the critical temperature can be raised enough). I will review the theory of superinsulation, with an emphasis on its analogy to confinement in hadron physics and describe some practical aspects of the new technologies made possible, either as a standalone, or in conjunction with other states of matter, like superconductors.

References

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Figures

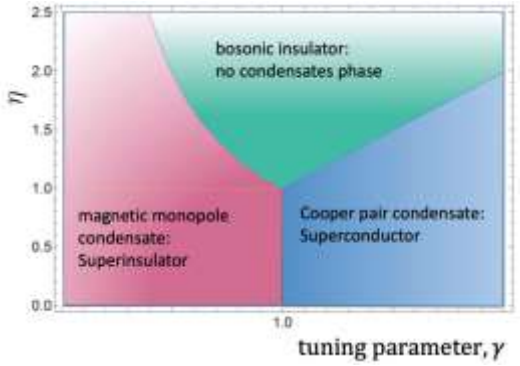

Figure 1: the dual phases of superconductivity and superinsulation of a granular film

Figure 2: a Cooper pair-Cooper hole pair linearly bound by an electric flux string