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Resolution limit in community detection MARC BARTHELEMY, CEA, SANTO FORTUNATO, Indiana University — Understanding the relation between structure and function in a complex network is a fundamental issue for practical applications in many disciplines such as biology or sociology. An important step in this direction has been made with the identification of communities through a now widely used method relying on the optimization of a quantity called modularity. However, we will show here that modularity optimization fail to identify modules smaller than a scale which depends on the total size of the network and on the degree of interconnectedness of the modules, even in cases where modules are unambiguously defined. We will illustrate this with simple examples taken both in artificial and in real social, biological and technological networks for which we show that modularity optimization indeed does not resolve a large number of modules. Reference: S. Fortunato and M. Barthelemy, PNAS, in press.

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