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Enhanced heat transport in partitioned thermal convection YUN BAO, Department of Mechanics, Sun Yat-Sen University, J. CHEN, State Key Laboratory of Turbulence and Complex Systems and Department of Mechanics and Engineering Science, College of Engineering, Peking University, BO-FANG LIU, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University, ZHEN-SU SHE, State Key Laboratory of Turbulence and Complex Systems and Department of Mechanics and Engineering Science, College of Engineering, Peking University, JUN ZHANG, Applied Math Lab, Courant Institute, New York University, QUAN ZHOU, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University — Enhancing heat transport across a fluid layer is of fundamental interest as well as of great technological importance. For decades, Rayleigh-Bénard convection, i.e. the motion of a fluid layer that is heated from below and cooled from above, has been a paradigm for the study of convective heat transport, and how to improve its overall heat-transfer efficiency is still an open question. Here we report an experimental and numerical study that reveals a novel mechanism that leads to dramatically enhanced heat transport. When vertical partitions are inserted into a convection cell with thin gaps left open between partition walls and the cooling/heating plates, it is found that the convective flow becomes much more coherent and self-organized, leading to a dramatically enhanced heat transport of up to 2.3 times that without any partitions. We expect that this surprising effect will lead to broad applications.

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