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**Heat-flux enhancement by vapour-bubble nucleation in Rayleigh-Bénard turbulence**[1] CHAO SUN, Tsinghua University, China. University of Twente, Netherlands, DANIELA NAREZO-GUZMAN, University of Twente, Netherlands. UCSB, Santa Barbara, USA, YANBO XIE, SONGYUE CHEN, DAVID FERNANDEZ-RIVAS, DETLEF LOHSE, University of Twente, Netherlands, GUENTER AHLERS, UCSB, Santa Barbara, USA — We report on turbulent convective heat transport enhancement and local temperature modifications in the bulk due to vapour-bubble nucleation at the bottom plate of a Rayleigh-Bénard cylindrical sample (aspect ratio 1.0, diameter of 8.8 cm) filled with liquid. Etched microcavities acted as nucleation sites. Only the central area of the bottom plate (diameter of 2.5 cm) with an array of microcavities was heated. The Nusselt-number $Nu$ was investigated as a function of the bottom plate superheat $T_h$ by varying the temperature of the bottom plate $T_b$ and keeping a fixed difference between $T_b$ and the top plate temperature $T_t$, $T_b - T_t \simeq 16$ K. Nusselt-number of both 1- and 2-phase flow for the same $T_h$ value was obtained; 2-phase-$Nu$ was increasingly enhanced relative to the 1-phase $Nu$ for increasing $T_h$. Varying the cavity density between 69 and 0.3 per mm$^2$ had only a small effect on the global $Nu$ enhancement; however $Nu$ per active site decreased as the cavity density increased. $Nu$ of an isolated nucleating site was found to be limited by the rate at which it could host a phase change.

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