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**Universal temperature dependence of the mass flux in solid helium**[1] ROBERT HALLOCK, YE. VEKHOV, Univ. of Mass. Amherst — The flux, $F$, carried by solid $^4$He, with nominal 300 ppb $^3$He concentration, $\chi$, in the range 25.6 - 26.3 bar rises with falling temperature and at a temperature $T_d$ the flux decreases toward zero [1]. The behavior of the flux above $T_d$ demonstrates the presence of a bosonic Luttinger liquid [2]. We study $F$ as a function of $^3$He concentration $\chi$ for $T > T_d$ to explore the effect of $^3$He on the temperature dependence of $F$. We find that $F$ is sample-dependent and that the temperature dependence of $F$ above $T_d$ is universal; data for all samples scales to collapse on a universal curve. The universal behavior extrapolates to zero flux in the vicinity of $T_h \approx 610$ mK. With increases in temperature, an activated process degrades the flux. One possibility is the presence of kinks on dislocation cores, which would introduce disorder and introduce phase slips.

[1] M.Ray and R.B. Hallock, PRL 105, 145301 (2010); PRB 84, 144512 (2011).
[2] Ye. Vekhov and R.B. Hallock, PRL 109, 045303 (2012).

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