Leggett Responds: The data of Hakonen *et al.*[1] constitute an important input to the ^{3}He-B nucleation puzzle. I believe that they are consistent with the proposed[2] cosmic-ray mechanism, provided that one important feature of this mechanism which was not noted in Ref. 2 is taken into account.

Irrespective of the nature of the nucleation process, the observation[1] that the $A \to B$ transition occurs only during the cooling, never when the temperature is stationary or rising, seems most naturally explained by the hypothesis that the transition can occur anywhere in the bulk liquid, including the "flange" in contact with the sinter (see Fig. 15 of Ref. 3), but that there is a sharp onset temperature,[1] say about $0.66T_c$. The assumption that during cooling (only) the temperature in the (outer part of) the flange leads that shown by the Pt NMR thermometer by, say, 5–10 min, which seems not implausible in view of the cell geometry[3] and the thermal lags quoted in Ref. 1, would apparently explain this aspect of the observed behavior.

The occurrence of a sharp onset temperature is in fact a natural consequence of the cosmic-ray model. To generate an adequate "baked-Alaska"[2] configuration, a δ electron must not only have an energy $E > E_c(T)$, it must also deposit at least $\frac{1}{3}E_c(T)$ as thermal energy within a volume whose radius is some fraction $\alpha \lesssim 1$ of the critical bubble radius $R_c(T)$. For $E = 400$ eV ($\equiv E_0$), the radius of the volume within which the energy is typically deposited is[4] about 650 Å ($\equiv l_0$). Since both the mean free path against large-angle elastic scattering and the total range scale as E^{-2}, it is highly plausible that for $(E/E_0)^2 l_0 \gg \alpha R_c$ the probability that the energy E_c is deposited in a volume of radius $\leqslant \alpha R_c$ is approximately of the form $A \exp\{-(E_c/E_0)^2 l_0/\alpha' R_c\}$, where $\alpha' \sim \alpha \lesssim 1$ and A is a constant of order unity. Now, defining $t \equiv (1 - T/T_{AB})$, we have[2] $R_c(t) \simeq r_0 t^{-1}$ and[5] $E_c(t) \simeq E_{c0} t^{-3}$. Hence the probability that a given δ electron nucleates an adequate "baked Alaska" is $A \exp[-(t_0/t)^5]$, where the quantity $t_0 \equiv [(E_{t0}/E_0)^2 (l_0/\alpha' r_0)]^{1/5}$ is about $0.22\alpha^{-1/5}$ at melting pressure (where[2] $E_{c0} \simeq 10$ eV, $r_0 \simeq 1000$ Å), and presumably not much different at 29.5 atm. The function $\exp(-z^{-5})$ rises steeply from about 3×10^{-6} for $z = 0.6$ to about 5×10^{-2} for $z = 0.8$. If we take the thickness of the flange to be ~ 1–2 mm and the cosmic-ray flux[6] incident on it to be about 7 per minute, and set $A \sim 1$, $\alpha' = 0.1$ (a reasonable value), we see that for $t = 0.205$ ($T/T_c \simeq 0.67$ at 29.5 bars) the lifetime against nucleation is of the order of months, while for $t = 0.275$ ($T/T_c \simeq 0.62$) it is already only a few minutes and decreasing fast. Given the cooling rates and assumed thermal time lags (see above) in the experiment, the predicted "catastrophe region" seems to be in at least qualitative agreement with the data.

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[5] It might be thought just as plausible to multiply the quoted (Ref. 2) $E_c(t)$ by a factor of order $\xi_0/R_0(T) \sim (8t)^{-1}$. This (or an intermediate) choice makes little difference to the general structure of the results (at reasonably high pressures).

[6] The flux per square centimenter quoted in Ref. 2 is too small by a factor ~ 3.

