Carlson *et al.* Reply: In a recent Letter we proposed a new smectic-A vortex liquid crystalline phase in the phase diagram (magnetic field H versus temperature T) of strongly anisotropic type II superconductors [1]. Our analysis was based on the study of the fluctuations of the crystalline Abrikosov vortex lattice, using an extension of the Lindemann criterion to the case of anisotropy [2]. If the external magnetic field is along the z direction, this extended criterion allows fluctuations in the x direction to compete with the vortex lattice spacing in the x direction and fluctuations in the y direction to compete with the spacing in the y direction. Our results suggest that the lattice may melt first in one direction, leading to a phase that has liquidlike correlations in that direction but retains solid order in the other—i.e., a smectic. In the preceding Comment, Hu and Chen [3], partly using our own results based on the crystalline elastic free energy, point out that there may be two additional, distinct melting scenarios. In the first, the two melting transitions collapse, indicating the nonexistence of any smectic phase. In the second, the two melting curves cross, leading to a triple point in the phase diagram.

We agree with their analysis and can reproduce it with a suitable choice of the parameters in our calculation. (In particular, the "crossing" can occur with planar pinning.) But we point out that their results do not, in general, imply the nonexistence of an intermediate smectic-A phase. To obtain the "collapse," Hu and Chen start from the extended Lindemann criterion but then choose a ratio of Lindemann numbers, c_x and c_y, such that the melting occurs in both directions at once. Not only does this correspond to a set of measure zero in the (c_x, c_y) plane, but, by scaling, one can show that it is just a restatement of the original isotropic Lindemann criterion, $\langle \tilde{u}_x^2 \rangle + \langle \tilde{u}_y^2 \rangle = c^2 a^2$ with $c^2 = \frac{1}{2}(c_x^2 + c_y^2)$, where $\tilde{u}^2$ represents the scaled fluctuations of the lattice. Furthermore, that a collapse is possible has no bearing on the fact that in the physical system, vortex fluctuations are more isotropic than the lattice spacing. That is, in the Comment of Hu and Chen, the fact that the fluctuations do not scale with the lattice spacing is artificially suppressed by a specific choice of the ratio c_x/c_y.

To further address theoretically the issue of which scenario occurs requires not only that one has a theory of elasticity in the smectic phase (something that has not yet been developed), but also that one go beyond the Gaussian approximation to the fluctuations. In addition, as we mentioned in our Letter, when the two Lindemann violation curves are sufficiently close (as happens near T_c or H_{c2}, or for very weak anisotropy), the "smectic region may be pinched off" by a first-order phase transition. Indeed, this is why we looked for a "significant" difference between the two curves we calculated in both Figs. 3 and 4. It is likely that these complicating factors can be resolved only by full numerical simulations of the interacting vortex system. Interestingly, existing numerical simulations of 2D vortices with anisotropic interactions support the occurrence of a smectic-A phase [4].

Apart from the Lindemann criterion analysis, there are good reasons to expect a transition from solid to liquid crystal, as we argued in our original Letter [1]. First, earlier work on the stability of a vortex liquid crystal in the presence of explicit symmetry breaking indicates that in the right geometry, pinning by crystal layers (translational symmetry breaking) [2] can lead to a vortex smectic-C. Second, a 3D smectic is stable in the presence of the explicitly broken rotational symmetry we studied. Specifically, whereas 3D smectics are generally thermodynamically unstable due to long wavelength rotational modes, those modes are gapped in the presence of explicitly broken rotational symmetry, and the phase is stable. Third, using a mapping of vortices onto 2D bosons [5] one can show that the system we studied has as its only possible intermediate phase the smectic-A [6]. Finally, as noted above, numerical calculations on the analogous 2D case with anisotropic interactions [4] lend support to our claim. While these arguments do not guarantee the existence of the smectic-A, the argument of Hu and Chen does not guarantee its *nonexistence*.

Note added.—In Fig. 4 of Ref. [1], $T_c = 90$ K. We thank Hu and Chen for bringing this omission to our attention.

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