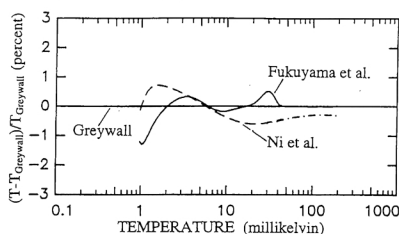


Low-Temperature Scales Come under Pressure

In "Temperature Scales Below 1 Kelvin" (PHYSICS TODAY, August 1997, page 36), Robert Soulen and William Fogle discuss helium-3 melting-curve thermometry and include a graph (figure 5) that supposedly compares millikelvin temperature scales determined in various laboratories. The 20% deviations that they show near 1 mK, however, are artificial and misrepresent the very fine general consensus among most modern millikelvin temperature scales.

The large deviations below 20 mK are a result of pressures having been referenced to $P_{\min}$. A melting-curve thermometer intended to accurately reproduce any given scale over the en-



tire range from 1 to 200 mK must use pressures measured relative to P_A .

The above figure shows various ^3He melting-curve calibrations compared to the Greywall scale¹ with pressures measured relative to P_A . Note that the calibrations by Hiroshi Fukuyama *et al.*² and Wen Ni *et al.*³ confirm the Greywall scale to within the uncertainties of the calibrations, thereby supporting, for the present, the continued use of this scale as the low-temperature standard.

References

1. D. S. Greywall, *Phys. Rev. B* **33**, 7520 (1986).
2. H. Fukuyama, H. Ishimoto, T. Tazaki, S. Ogawa, *Phys. Rev. B* **36**, 8921 (1987).
3. W. Ni, J. S. Xia, E. D. Adams, P. S. Haskins, J. E. McKisson, *J. Low Temp. Phys.* **99**, 167 (1995).

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SOULEN AND FOGLE REPLY: It was not our intent to misrepresent the data of Dennis Greywall or any other researcher. We clearly stated that the 20% difference at 1 mK between the Greywall and Florida scales was due to pressure differences, not temperature differences, as Greywall notes.

We observe that the "very fine general consensus" he refers to is rather

selective. The recent results of Gerhard Schuster *et al.*,¹ which are the culmination of many years of work by the Federal Institute of Physics and Metrology (the German standards laboratory), yield temperature and pressure values that differ significantly from those presented above (see the table on page 41 and associated discussion in our article).

Most important, Greywall misses the main point of our article. An internationally disseminated temperature scale must be rigorous and defined in a way that makes it accessible to a broad range of users. For example, most laboratories conducting research below 1 K today need a temperature scale down to 5 or 10 mK, the lower limit of modern dilution refrigerators. Thus, the labs are unable to reference their pressures to P_A , as is required by Greywall's method. They would be best served by normalization to $P_{\min}$.

Reference

1. G. Schuster, A. Hoffmann, D. Hecht-fischer, *Temperature Scale Extension below ITS-90 Based on ^3He Melting Pressure*, vol. 19, doc. CCT/96-25, Bureau International des Poids et Mesures, Comité Consultatif de Thermométrie, Sèvres, France (1996).

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Computer Security Is Going to the Dogs

Martin Libicki's and Mark Buell's letters about e-mail-borne computer viruses and "Trojan horse" programs (PHYSICS TODAY, March, page 117) fail to mention the remarkable security approach being developed by Microhard Corp's division of guardian systems. It is based on the idea that dogs can be trained to detect computer viruses by sniffing. Test dogs have already learned to detect computer bacteria, and virus-detection Labrador trials are now under way. Also, field trials have been set for 1 April to learn if the foxhound has a special aptitude for sniffing out Trojan horses. In 1999, Microhard will start training selected dogs to perform remote virus detection, using icon-based software and keyboards. In addition to the Lab, Microhard is using the Scoprifore, a rare Italian pointer renowned for its iconographic nature, molecular sensitivity and unusual shagginess.

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