If soft x rays may be said to begin at 100 Å, some people believe that coherent x rays are likely to become a reality soon. The uses of such radiation would include the study of crystals and biomolecules, and photolithographic techniques for producing super-miniaturized electronic microcircuits. —HRL

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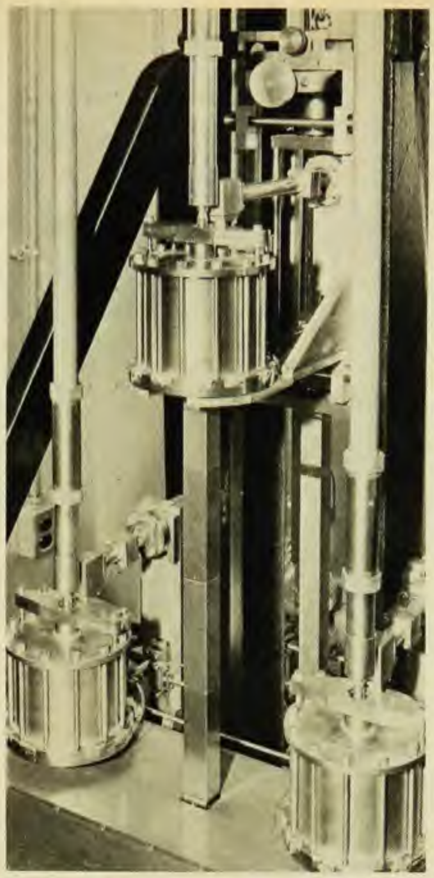
New values for boiling and freezing points

The values assigned to the temperatures of the boiling point of water and the freezing points of tin and zinc on the International Practical Temperature Scale of 1968 appear to be significantly higher than thermodynamic values. The new measurements, done by Leslie Guildner and Robert Edsinger with a very carefully built gas thermometer at the National Bureau of Standards, may lead to a redefinition of the International Practical Temperature Scale.

Although experimenters have made temperature measurements for many years with classical gas thermometers, Ralph P. Hudson, chief of the Bureau's Heat Division, says "They were polishing a slightly rotten apple. We decided to do it right." The project began about 20 years ago, with both Guildner and Edsinger working on it almost from the beginning. Their first determination was the thermodynamic temperature of the steam point, which they found to be 99.975 °C, a discrepancy with the IPTS-68 (the most recent revision) of −0.025 °C. Subsequently they found the tin and zinc freezing points to be 231.924 °C and 419.514 °C, which are lower than the values on the IPTS-68 by 0.045 °C and 0.66 °C, respectively.

The 1968 revision is based primarily on gas thermometry, the work most immediately preceding being done at the Physikalische Technische Bundesanstalt in Braunschweig by Helmut Moser and Wilhelm Thomas and at the National Research Council in Ottawa by Hugh Preston-Thomas and Chris Kirby.

The NBS results differ from and are thought to be more accurate than earlier gas-thermometry values for two reasons: First, the NBS group developed instrumentation to allow the highest level of metrology for the measurement processes such as thermal expansion, thermomolecular pressure and the realization of pressure ratios, Hudson told us. For example, the precision mercury manometer has a total uncertainty in pressure ratios of only 1.5 ppm. Second, the effect of sorption, which is thought to be the principal source of systematic bias between the NBS work and earlier gas thermometry, is believed to be insignificant in the new results because of a comprehensive effort to minimize it.



NBS precision mercury manometer has a total uncertainty in pressure ratios of 1.5 ppm.

The next step for the NBS team will be to measure the freezing point of aluminum, near 660 °C. Eventually they are aiming for measurement at the gold point near 1064 °C to incorporate in a new version of the IPTS. The latter was revised in 1948, 1968, and will be revised again in the not-too-distant future, perhaps as early as 1983, according to one member of the Advisory Committee on Thermometry; this group reports to the International Committee of Weights and Measures. —GBL

Nobel prize

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LBL group found a second narrow resonance decaying to hadrons, simply by scanning the entire region in 1-MeV steps. The new resonance had a mass of 3.695 GeV.

Much later, Richter said,[2] "It has been particularly satisfying to have witnessed the birth of a new class of particles; the ψ's with their unexpected properties. Every experimentalist dreams of making the great discovery—a discovery which will change the direction of scientific thought. I don't know yet if the colliding-beam machines and the new particles we have discovered with them will cause a sharp change in that direction, but surely they have bent it a bit."

Ting and his Brookhaven–MIT collaborators (Ulrich Becker, Min Chen and others) had been studying quantum electrodynamics, photoproduction of vector mesons and e^+e^- pair decay of vector mesons for the last ten years at DESY, where they developed techniques to identify electron–positron pairs from a background of millions of hadrons. They started their experiment at the Brookhaven AGS, searching for new particles in the reaction $p + Be \rightarrow e^+ + e^- + X$ with a precise pair spectrometer that had a mass resolution of 5 MeV. They saw a sharp peak at 3.1 GeV with a width consistent with zero (consistent with their mass resolution). They called it the "J" particle. The peak was first observed in August 1974, Ting recalls.[3] The group decided to make many experimental checks, such as decreasing the magnet current. They then spent late October and the first week in November measuring the anomalous $e^\pm/\pi^\pm$ ratio, hoping that the J could explain this number.

On 6 November Ting decided to publish[4] the work on the J. On 11 November Ting, who was visiting SLAC for a Program Advisory Committee meeting, went to W. K. H. Panofsky's office and told him and Richter of the MIT results. Richter reciprocated with the SLAC–LBL results. Within a short time the Adone storage ring in Frascati also discovered the J/ψ particle. "It was the shot heard 'round the world," at least in the circles traveled by particle physicists.

Biographies. Richter earned his BS and PhD at MIT. In 1956 he went to Stanford University and in 1963 joined the staff of SLAC, where he has been a professor since 1967.

Ting got his bachelor's and doctorate at the University of Michigan. In 1963 he went to CERN and then joined Columbia University's physics department the following year. He went to MIT in 1967, where he became a professor in 1969. Since 1966 Ting has been doing experiments at DESY. —GBL

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