argued that efficient compression of the plasma fuel, avoiding instabilities and other undesirable effects produced by the interaction of the plasma with the laser beam itself, required that laser beams be limited below certain definite power fluxes. Soviet research therefore concentrated on designing thin-shell hollow targets requiring less laser power input for implosion. U.S. scientists persisted in high-power beam development, arguing that thin-shell targets would themselves produce hydrodynamic instabilities.

Behind this disagreement is a fundamental theoretical question: What is primary in inertial fusion? The implicit assumption of the American view was that input energy is primary. The fusion process is implicitly assumed to be entropic, and what is therefore deemed crucial is a maximum of energy input to drive the plasma to fusion conditions before countervailing instability and energy dissipation can take over.

Implicit in the Soviet approach, however, was the opposite view (long explicitly held by America's Fusion Energy Foundation and others), that the fusion process is negentropic. Energy input does not drive the plasma to fusion. The plasma drives itself to fusion. Energy input merely establishes the initial configuration that triggers such self-ordering plasma behavior. The problem is not energy input, but how to design the target geometry and the deposition of energy input so as to best use the thermonuclear burn process the plasma itself develops. Energy input, as "trigger" for the plasma's evolution, must not interfere with it. During the 1970s, the leading features of the Soviet view were proven correct, as instabilities, decreased laser-light absorption, and pre-heating by hot electrons, reduced implosive efficiency. Each of these obstacles was an unwanted result of the plasma's interaction with a too-powerful laser beam.

Recent experiments at Lawrence Livermore Laboratory in California now confirm that when laser-beam power fluxes are kept below the limits specified by the Soviet specialists, a maximum percentage of laser light is converted to soft X rays, without generating the "hot electrons" responsible for the pre-heating problem.

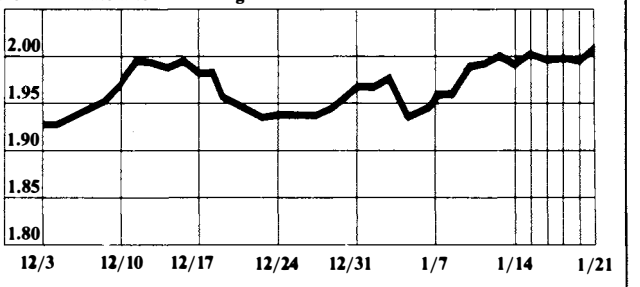
Moreover, the instabilities U.S. scientists had imputed to thin-shell targets—they now agree—are not important when soft X rays are employed.

It is now believed that the Soviet program always presumed the conversion of laser light to soft X rays, and that Soviet thin-shell target designs were therefore based on this presumption. What still remains in dispute is exactly how ignition and "burn" of fusion fuel (through thermonuclear-burn shock waves) actually proceeds. There are indications that the Soviets have made a breakthrough in this area, and may have refined their target designs on the basis of such a new appreciation of the negentropic fusion-fuel "burn" process.

Currency Rates

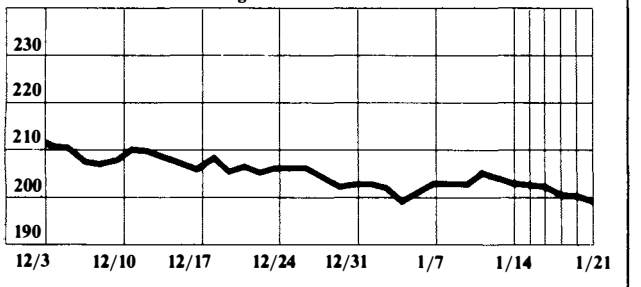
The dollar in deutschemarks

New York late afternoon fixing



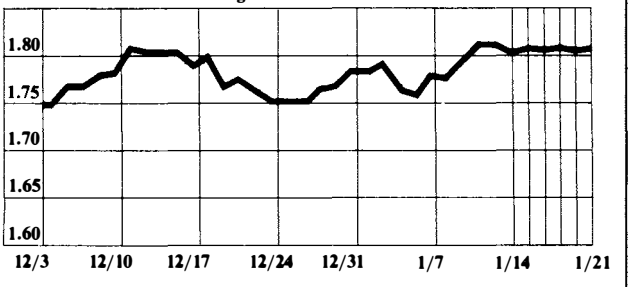
The dollar in yen

New York late afternoon fixing



The dollar in Swiss francs

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing