voluntary offer safeguards agreement. The answer should be yes. One reason is that during the negotiation of the standard NPT safeguards agreement, Australia introduced into the record a statement, which was uncontested, that all enrichment plants in non-nuclear-weapons states would be subject to safeguards regardless of the intended end use of the product material.

Brazil's enrichment facility uses that safeguards approach even though it produces fuel for its naval reactors. The US–IAEA safeguards agreement, in turn, specifies that the IAEA "shall" follow the same procedures in the US that it uses in applying safeguards "on similar material in similar facilities in non-nuclear-weapon States."

A second point also bears on the relationship between civil nuclear and military activities. In his story, Kramer writes, "US policy stipulates that uranium used for any military purpose, including nuclear fuel, must be enriched using US-origin technology." He goes on to say that a corollary would seem to require that all US commercial reactor fuel be enriched using US nuclear technology since US military bases draw power from the grid.

While that might seem so, in the course of negotiating agreements for nuclear cooperation, the US and its partners have consented to permit transfers to be used for specified military purposes. More precisely, supplying power to military bases is excluded from the definition of military purposes. The agreement with Russia states, for example, that "military purposes shall not include provision of power for military bases drawn from any power network, production of radioisotopes to be used for medical purposes in military hospitals, and other similar purposes as may be agreed by the Parties." Provisions with the same effect are included in other US agreements for nuclear cooperation.

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Letters and commentary are encouraged and should be sent by email to **ptletters@aip.org** (using your surname as the Subject line), or by standard mail to Letters, PHYSICS TODAY, American Center for Physics, One Physics Ellipse, College Park, MD 20740-3842. Please include your name, work affiliation, mailing address, email address, and daytime phone number on your letter and attachments. You can also contact us online at **https://contact.physicstoday.org**. We reserve the right to edit submissions.

Holes in lattices in liquids

In their feature article in the February 2019 issue of PHYSICS TODAY (page 38), Robert Evans, Daan Frenkel, and Marjolein Dijkstra quote from "About liquids," an essay in which Victor Weisskopf discusses the mysterious nature of liquids.[1]

Around 1960, when I was a graduate student at the University of Washington, the thesis project of one of my fellows was to calculate the entropy of a hole in a crystal lattice. The seemingly quixotic nature of the assignment—"A hole is a nothing. How can it have an entropy?"—led to much merry banter in our group. Today, the idea of holes in lattices is well established.

Evaporation (or sublimation) occurs when molecules on the surface of a condensed phase acquire enough energy to break free, enter the gas phase, and thus achieve unconstrained mobility. Similarly, for crystalline solids, there is a characteristic temperature—the melting temperature—at which the holes become mobile and move freely throughout the lattice. Noncrystalline solids such as rubber and plastics have a range of hole and dislocation types that reach mobility at various temperatures; they soften gradually rather than exhibiting a sharp melting point.

I find that the molecule/hole analogy provides a satisfying way to visualize the phenomenon of melting and the nature of liquids.

Reference

1. V. F. Weisskopf, *Trans. N. Y. Acad. Sci.* **38**, 202 (1977).

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Correction

February 2020, page 21—Edmund Bertschinger of MIT and Mary James of Reed College jointly cochaired the TEAM-UP task force. PT