thereafter. He says the new two-phase space-station plan confirms his view that NASA is "not honoring its commitment" to man-assisted space science; he would prefer to see early deployment of small, tended platforms.

Others think the space station is a bad idea altogether. One is Thomas M. Donahue, chairman of the National Research Council's Space Science Board. Donahue wrote to congressional committees in April urging that NASA be forced, if necessary, to purchase expendable rockets so that unmanned space-science missions could be flown. Donahue believes there is no urgent scientific justification for a space station and thinks its budget is eating into space science. He adds: "We risk repeating the experience of the *Challenger*."

Reaction to NASA's plan in Congress was mixed, and the reduced power provoked skepticism. One option being discussed would exclude foreign users of the station until power had reached the previously planned 87.5-kilowatt level. Detailed congressional scrutiny will be deferred until a report on cost being drawn up by the National Research Council is completed in September. Negotiations with foreign space-station partners should, however, become somewhat easier: U.S. agencies recently agreed on a new proposed text for the formal intergovernmental agreement that goes some way toward meeting European objections to unfettered U.S. military access.

The Impossible Dream

More than 20 years ago Edwin T. Jaynes of Washington University in St. Louis and Frederick W. Cummings of the University of California at Riverside considered how a single excited atom would behave in a resonant metal cavity "tuned" to a particular electromagnetic frequency. Such an atom can emit a photon, or quantum of electromagnetic energy, that establishes a radiation field, from which the atom can then reabsorb a photon. The two theorists predicted that the frequency of such photon exchanges would be influenced by the presence of other photons in the cavity and so would affect the overall likelihood that the atom would be found in an excited state.

Jaynes and Cummings showed that as more photons are included in the cavity, the number of photons interacting with the atom becomes indeterminate. This indeterminacy implies there is no longer a definite photon-exchange frequency but rather a distribution of such frequencies, and the probability of finding the atom in an excited state drops. If the field and the atom interact long enough, however, the field can eventually manifest itself to the atom as a discrete number of photons, and the probability of finding the atom in an excited state increases correspondingly.

At the time they outlined their theory Jaynes and Cummings considered their postulated system to be impossible to realize in practice. But times change, and now Gerhard Rempe and Herbert Walther of the University of Munich and Norbert Klein of the University of Wuppertal have actually re-created the theorists' thought experiment: they stimulated an excited rubidium atom to emit a photon of microwave radiation in a supercooled, superconducting resonant cavity.

To make the atoms enter the cavity one at a time the German workers passed a collimated beam of rubidium atoms through a series of rotating slitted disks, adjusting the rotational speed so that only atoms traveling in single file and at a certain velocity could run the gauntlet into the tiny entrance hole of the cavity. Just before entering the cavity each atom was excited by a laser to a high-energy state from which it could emit a microwave photon. A detector placed outside the cavity's tiny exit determined whether an atom leaving the cavity had left a photon behind.

So little energy leaks out of the resonant cavity that a photon emitted by an excited atom can loiter in the cavity long enough (about two milliseconds) to be absorbed either by the same atom or by another one following it. Hence an excited atom enters the cavity, where it can emit and absorb photons repeatedly. If the emerging atom is not in an excited state, the cavity field for the next atom has been enriched by one photon.

Since the investigators could regulate both the average number of photons in the cavity (by adjusting the rate at which the atoms entered the cavity) and the atoms' length of stay in the cavity (by adjusting the velocity of the atoms), their experimental setup was ideal for checking the validity of the Jaynes-Cummings theory. As the experimentalists report in *Physical Review Letters*, the results are in agreement with the predicted behavior.

Central Heating

By compressing minute samples of iron between two diamonds and striking thin iron targets with high-speed projectiles, investigators have arrived at unprecedentedly high estimates of the temperatures prevailing in the earth's core. Writing in *Science*,