Pressure-Induced Superconductivity in Lithium Metal to 670,000 Atmospheres

James S. Schilling, DMR-0101809

Superconductivity at or above room temperature would likely have important technological implications. It has been predicted that molecular hydrogen, a good insulator, may turn into the lightest alkali metal, and become a room temperature superconductor, if it is subjected to millions of atmospheres pressure. Valuable information on metallic hydrogen can be obtained by first studying the 2nd lightest alkali metal, lithium, which we have recently shown becomes a type I superconductor under nearly hydrostatic pressures above 200,000 atmospheres.

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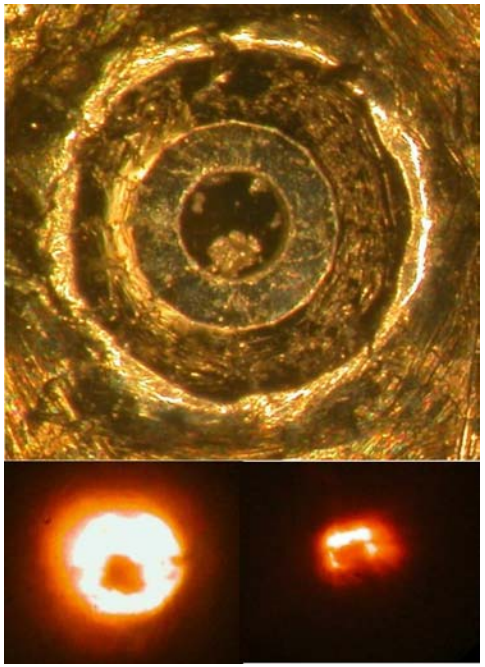

The tiny lithium sample is seen in a 0.25 mm dia hole in a rhenium gasket at ambient pressure (upper, lower left). The hole is filled with liquid helium and then compressed from both sides by two opposing diamond anvils. The lithium sample becomes superconducting under 300,000 atmospheres pressure (lower right).

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Education:

This work is part of the Ph.D. research of Shanti Deemyad *(2nd from left)*. Graduate student James Hamlin *(4th from left)* gave assistance. Other group members are the undergraduate Brett Beckett and the graduate student Takahiro Tomita *(3rd from left)*]. Graduate student Shanti Deemyad received a Dissertation Fellowship for 2004. James Hamlin received a Delos Summer Fellowship while an undergraduate in 2001. Former graduate student Craig Looney, now Associate Professor of Physics at Merrimack University, visits yearly to carry out collaborative research.

Outreach:

The PI is Chair of the GAANN Oversight Committee. He also helped organize weekend workshops on 'How to get a Job' for Arts & Sciences students. He is also Chair of the Graduate Admissions Committee and representative to the Graduate Council.