SUPERCONDUCTIVITY

Theory Debate Gets Literary, and Ugly

Research papers are rarely a lively read. The results being reported might be of immense significance, but the papers are almost always written in the formal, impersonal style that has come to characterize scientific publications. Not so for a recent paper in *Physical Review Letters* (*PRL*), which compared one "not so beautiful" theory of high-temperature superconductivity (HTS) to a "figure in a cartoon" and made withering use of literary references.

Soon after researchers showed in 1986 that complex copper-oxide ceramics could conduct electricity without resistance at temperatures far higher than the metal alloys that held the record at the time, it became obvious that the existing theory of superconductors could not explain the new materials. When the maximum superconducting temperature stalled at about 125 kelvin, researchers looked to theorists to provide some guidance around the impasse, but so far they have shed little light. Indeed, it is often remarked that there are as many HTS theories as there are theoretical physicists working on the problem. As a result, says Julius Ranninger of the Centre for Very Low Temperature Research in Grenoble, France, the world of HTS theories is "very delicate, with a lot of bad blood and infighting."

> The HTS theory world is "very delicate, with a lot of bad blood and infighting."
>
> —Julius Ranninger

Ranninger should know. He was an author, with Benoy Chakraverty and Denis Feinberg of the Laboratory for the Study of the Electronic Properties of Solids in Grenoble, of the *PRL* paper that has sparked the latest debate, which is as much about style of discourse as it is about science. The paper discusses a theory that attributes superconductivity to bound pairs of polarons—the distortion in the crystal lattice of an HTS material caused by the charge on an electron. The formation of electron pairs is an essential feature of any theory of superconductivity. In 1981, before the discovery of HTS, Ranninger and Sasha Alexandrov, now at Loughborough University in the United Kingdom, published a paper suggesting that the pairs of polarons, or bipolarons, might be superconducting. Alexandrov has continued to champion the bipolaron approach, but Ranninger has since abandoned it.

The title of the paper by Chakraverty, Ranninger, and Feinberg, "Experimental and theoretical constraints of bipolaronic superconductivity in high-T_c materials: An impossibility," hinted at its tone. And there was no circumspection in its statement that "We shall show that extending the bipolaron theory for superconductivity to [HTS] materials is fallacious." The paper claims to show that the bipolaron theory is unable to predict superconducting transition temperatures any higher than 10 kelvin—clearly too low to explain HTS. But what has most angered proponents of bipolaron theory is the authors' parting shot: "The tragedy of beautiful theories, Aldous Huxley once remarked, is that they are often destroyed by ugly facts. One perhaps can add that the comedy of not so beautiful theories is that they cannot even be destroyed; like figures in a cartoon they continue to enjoy the most charming existence until the celluloid runs out."

It was Thomas Huxley, not Aldous, who mused on the fate of beautiful theories at the hands of ugly facts, but the mistake did not lessen the sting. On 13 July, the same day that the paper appeared in *PRL*, Alexandrov submitted a "comment" on the paper to *PRL* and the Los Alamos e-print server in which he argued that the objections in the paper were "the result of an incorrect approximation ... and the misuse of the bipolaron theory." He concluded by stating: "What is clear, however, is that any theory, beautiful or not, cannot be destroyed by 'ugly' artifacts [such] as those in Chakraverty *et al.*" In an interview, Alexandrov added that he found the final paragraph "unhealthy and not motivated by any reason." Moreover, he adds, he has heard the same reaction from many other physicists.

Ranninger says the last paragraph of the paper was written specifically to "calm the situation" and does not think that it was provocative. Reaction to the paper in the HTS community has been mixed. In a letter to Ranninger, Alexei Abrikosov of the Argonne National Laboratory in Illinois wrote: "I would like to express my pleasure upon reading your paper about bipolaronic superconductivity. I completely agree with it, and I appreciated the last two sentences." Alan Bishop of Los Alamos National Laboratory in New Mexico, however, calls the tone of the *PRL* paper "unhelpfully polemic." Bishop adds, "I might comment in the same vein [that] 'Beauty is in the eye of the beholder.' In this case there are several beholders."

–PETER RODGERS

Peter Rodgers is editor of *Physics World*.

ScienceScope

STANFORD PSYCHIATRIST FINED IN TENURE BATTLE

Stanford University has fined and suspended a tenured psychiatrist in the latest round of a case that some observers see as a worrisome sign of university attempts to narrow the rights associated with tenure.

Stanford's Academic Council ruled last month that Adolf Pfefferbaum, a 22-year veteran of the Palo Alto Veterans Administration Hospital known for his research on schizophrenia, flouted school policy when he quit the hospital in 1996 due to what he called "intolerable" working conditions. He asked to move to the university's medical school, where he had a joint appointment. The university refused, arguing that he had lost his protected post when he left the VA, his primary employer (*Science*, 3 October 1997, p. 27). After Pfefferbaum sued, a judge ordered him reinstated pending a university inquiry, completed recently. In its report, the council concluded that Pfefferbaum—now the head of psychiatry at SRI International in Menlo Park, California—had failed to prove a "hostile" working environment and had no right to "unilaterally" change his academic duties. Although President Gerhard Casper wanted to fire the errant professor for neglect of duty—and made it clear that he will not tolerate similar gambits by other academics—the council recommended leniency. It suspended Pfefferbaum for 3 years and ordered him to pay a $20,000 fine if he wants to come back to campus. The decision helps clarify what constitutes a "reasonable academic assignment," says Stanford statistician Bradley Efron, one of the report's authors.

STANFORD

Adolf Pfefferbaum

Pfefferbaum's attorney, former California congressman Pete McCloskey, says his client has not yet indicated whether he will return to Stanford. Meanwhile, McCloskey says he will ask a judge to overturn Stanford's "unconscionable" action when he goes to court on related litigation in September. He adds: "We have not yet begun to fight."

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