Crediting our predecessors

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In June 2006 I phoned David Thouless to talk about a news story I was writing for PHYSICS TODAY. The topic was an ingenious experiment by Zoran Hadzibabic and his collaborators that demonstrated a topological phase transition in flattened clouds of ultracold rubidium atoms. Ten years later, the Royal Swedish Academy of Sciences awarded the Nobel Prize in Physics to Thouless and his collaborator Michael Kosterlitz for predicting that same phase transition in a 1973 paper.

In the title of his 2006 paper, Hadzibabic referred to the transition as the "Berezinskii-Kosterlitz-Thouless crossover." Not having heard of the first of the trio of names, I asked Thouless about it. He recounted that in 1972, when he and Kosterlitz were getting ready to submit their paper, he visited Paris. There, he met another visiting physicist, Paul Martin, who brought his attention to two papers by Vadim Berezinskii. "I got confused at first because the first Berenzinskii paper misses it," Thouless told me. "But the second one got it."

"How did his treatment differ from yours?" I asked.

"He didn't do the renormalization group stuff, but the basic idea is the same. I prefer 'BKT.' He definitely has priority."

Berezinskii died in 1980 at the age of 44 after a long and difficult illness. Despite that life cut short, he made an impact on physics. The seven eminent Russian physicists who wrote his obituary noted that besides his work on topological phase transitions in two-dimensional systems, Berezinskii also elucidated the transport properties in 1D organic conductors, well before the first carbon nanotubes had been characterized.[1] That work and others, the obituarists asserted, put Berezinskii among the world's foremost theoretical solid-state physicists.

My conversation with Thouless brought to mind at the time—and again as I write this column—a similar conversation I had in 2004 with another theoretical physicist, Sankar Das Sarma. In December of that year I phoned Das Sarma to talk about two experiments that reported evidence of a spin Hall effect in wafers of gallium arsenide. Both experimental groups acknowledged that two theorists, Mikhail Dyakonov and Vladimir Perel, had predicted one kind of spin Hall effect in 1971. Das Sarma observed that Dyakonov and Perel's paper "languished as one of those esoteric effects that theorists predict." Then, in 1999, Jorge Hirsch rediscovered the effect and elaborated its properties. In doing so, he sparked interest in the effect and its subsequently discovered relatives. Now the effect underlies new devices (see the article, "Surprises from the spin Hall effect" by Jairo Sinova and Tomas Jungwirth, PHYSICS TODAY, July 2017, page 38).

TO READ GRACE MARMOR SPRUCH'S 1979 ARTICLE ABOUT PYOTR KAPITSA, VISIT physicstoday.org/Sep2018d

Reading and crediting prior work is, of course, a matter of professional propriety. Raymond Goldstein makes that case in his article, "Coffee stains, cell receptors, and time crystals: Lessons from the old literature," which begins on page 32. But he also urges us to study the history of a field to uncover motivations that have been lost in time. That history, he says, makes for more interesting papers and seminars.

Inspired by Goldstein, I dipped into the collected papers of Pyotr Kapitsa. There, besides his work on nuclear physics, high magnetic fields, and superfluidity, I discovered a short 1949 paper on wind-driven sea waves.[2] From Grace Marmor Spruch's article, "Pyotr Kapitsa, octogenarian dissident" (PHYSICS TODAY, September 1979, page 34), I learned the cause of Kapitsa's foray into physical oceanography. Summarily dismissed from his Moscow lab in 1948, he worked from the garage of his summerhouse until, after Stalin's death in 1953, he was reinstated.

Kapitsa published his paper in the proceedings of the USSR Academy of Sciences, not a specialized journal. As far as I can tell, the paper has not been cited by physical oceanographers, even though it purported to offer a more accurate analysis of the "sheltering theory" of wave formation that Harold Jeffreys published in a much-cited 1925 paper.[3] I hope my modest dip into archival literature and Goldstein's more extensive delvings will encourage you to explore old papers. It'll be worth it.

REFERENCES

1. A. A. Abrikosov et al., *Sov. Phys. Usp.* **24**, 249 (1981).
2. P. L. Kapitza, *Doklady Akademii Nauk USSR* **64**, 513 (1949).
3. H. Jeffreys, *Proc. Roy. Soc.* **107**, 197 (1925).

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