represent a definitive demonstration and characterization of an archetypical Luttinger liquid. Their photoemission data demonstrate that electrons at the Fermi level are confined to a single surface state that disperses only along the wire direction. They measure no dispersion in the perpendicular direction — establishing that the chains are electronically decoupled from the substrate and from one another, and thereby resemble one of the closest approximations to a 1D electron system reported to date. Moreover, the power-law scaling of the density of states they measured by STM and photoemission are in quantitative agreement. The high level of accuracy and consistency provided by two different experimental probes is rare and provides the strongest possible support for the LL interpretation. The only piece missing is direct evidence in the photoemission data of spin-charge separation. It should be noted, however, that as the spectral weight distribution between the spin and charge excitations in photoemission depends on the interaction strength[9], it is quite possible that only the charge excitations in the authors' gold chains are visible in their data.

The establishment of the LL in a self-assembled gold atomic chain provides a promising test-bed to study many related effects. Indeed, by bridging adjacent chains with interstitial atoms manipulated into place by STM, one could explore finite-size and dimensional crossover effects. Perhaps even more importantly, simple model systems such as Au on Ge(001) are useful stepping stones toward understanding electronic correlations in much more complex materials. Spin-charge separation is an important ingredient in current theories of the cuprate superconductors. The origins of high-temperature superconductivity in these compounds are not yet fully understood. And beyond such fundamental concerns, the intrinsically different charge and spin channels that emerge in LLs could yet have practical application in the development of spintronics. ❐

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SCIENTIFIC LITERATURE

Less room for failure

The title of the paper may not have been particularly enticing, but its contribution was important: in "Negative results of an attempt to detect nuclear magnetic spins" (*Physica* **3,** 995–998; 1936), Cornelis J. Gorter (pictured) reported calorimetric experiments aimed at detecting nuclear magnetic resonance in crystals of lithium fluoride and in alum. He had failed.

With his idea of irradiating a magnetic dipole transition between two Zeeman levels, Gorter was precisely on track to make the first observation of nuclear magnetic resonance (NMR), but not with his choice of samples. Stimulated by Gorter's work, two years later Isidor Rabi used the resonance technique to successfully measure nuclear magnetic moments in molecular-beam experiments. And in 1945 and 1946 — by which time Gorter had published further negative results (*Physica* **9,** 591–596; 1942) — groups led by Edward Purcell and by Felix Bloch independently reported the detection of NMR signals from solid paraffin and from liquid water, respectively. Rabi, Purcell and Bloch all went on to Nobel honours, but Gorter was left to wonder, as he reflected later in his career on this and other instances, about his "bad luck in attempts to make scientific discoveries" (*Phys. Today* **20** (1), 76–81; 1967).

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Gorter's reporting of negative results may seem laudable, but is something less likely to be found in the scientific literature of today, with competition for funding and recognition so fierce. In a systematic study of the disappearance of negative results from the literature, Daniele Fanelli has found that the phenomenon is indeed widespread and getting more pronounced (*Scientometrics* http://dx.doi.org/10.1007/s11192-011-0494-7; 2011).

Fanelli has perused 4,656 papers published between 1990 and 2007, sampled from over 10,800 journals from across the physical, biological and social sciences. All of the papers claimed to have tested a hypothesis, and Fanelli noted whether the reported findings supported the hypothesis, or not. Averaged over all of the papers studied, Fanelli found that the odds of reporting a positive result increased by around 6% every year over the period considered.

The trend was most pronounced in the social sciences, and more so in the biological sciences than the physical. But a tendency to report positive results was evident in most disciplines, physics included. And there were regional trends too: across Fanelli's sample, corresponding authors based in Asian countries (and in Japan particularly) tended to report more positive results than in the USA, who in turn reported more positive results than their colleagues in Europe (especially more than those in the UK).

Fanelli concludes that research "is becoming less pioneering and/or that the objectivity with which results are produced and published is decreasing." This is not only a loss for science, but also invites the question of how, on a global scale, resources for research should be best utilized.

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