Quantum magnetism in a simple metal

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Chromium is commonly used as a metallic layer in car bumpers and is a crucial element for stainless steel. In addition, chromium is the only element in the periodic table that displays antiferromagnetism, where the electron spins form a spin-density wave of alternating up and down spins. In this talk, I will show that despite being a common and "simple" metal, chromium displays unusual physical properties not described within the standard models of solid state physics that are usually limited to much more complex materials. It has a quantum critical point[1] and exhibits non-Fermi liquid behavior[2]. In addition, when the film thickness is thin, the spin-density wave is quantized[3].

References

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[2] "Non-Fermi liquid behavior in a simple metal", Ravi K. Kummamuru and Yeong-Ah Soh, unpublished.

[3] "Electrical effects of spin density wave quantization and magnetic domain walls in chromium", Ravi K. Kummamuru and Yeong-Ah Soh, Nature **452**, 859-863 (2008).