Building an atomic-scale vacuum trap for spin-polarized electrons

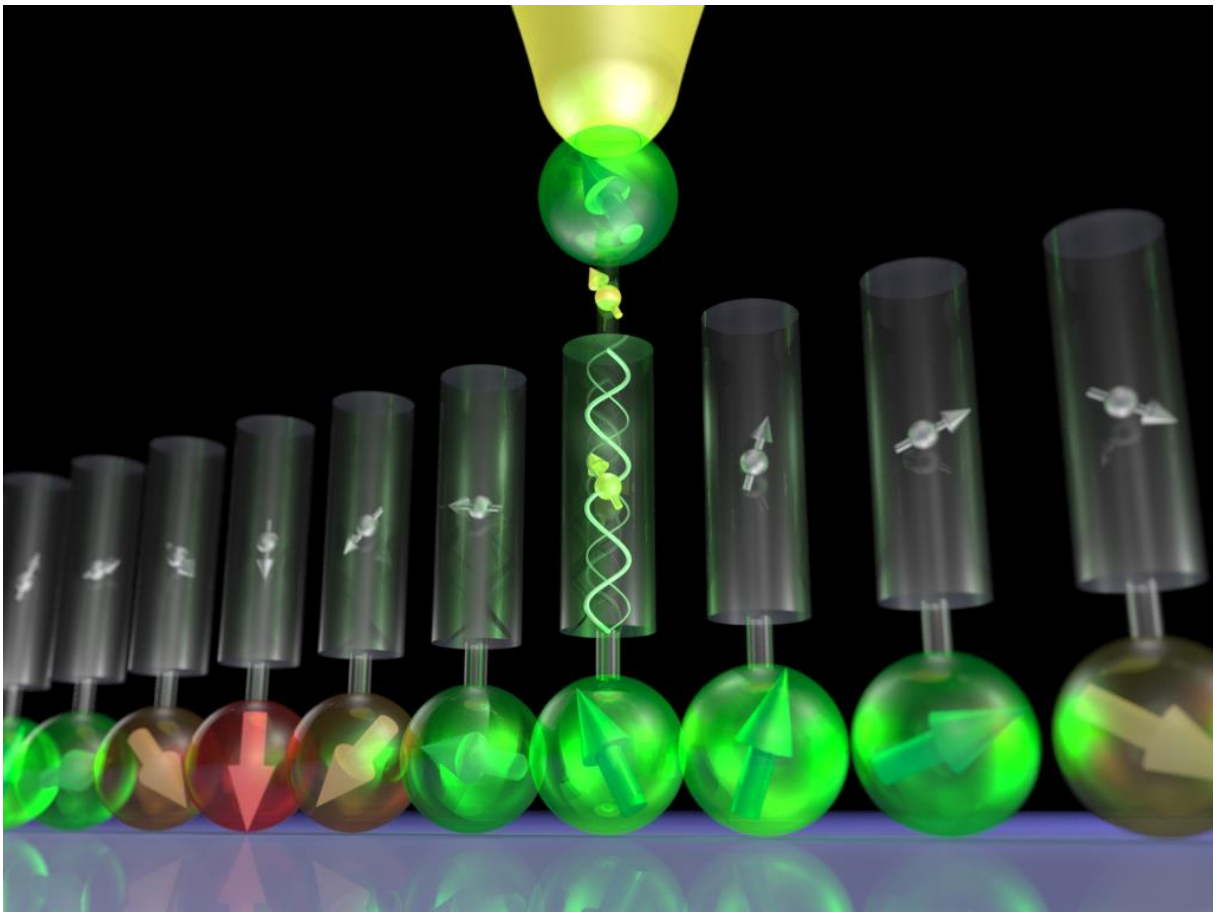

Figure: *Artist's view of the injection of spin-polarized electrons into a vacuum trap formed between an atomically sharp tip and magnetic atoms on a surface. (Courtesy of S. Krause, University of Hamburg).*

Physicists at the University of Hamburg in Germany experimentally realized a spin-resolved electron interferometer on the atomic scale. They placed an atomically sharp magnetic probe tip in front of a magnetic sample surface, thereby realizing a one-dimensional trap for electrons in the gap. Only when resonance conditions in terms of electron energy and spin are fulfilled, standing wave states evolve in the trap, and injection of spin-polarized electrons into these states allows for the investigation of single electron reflection at the underlying atom at the surface. Providing unprecedented insights into the atomic-scale scattering mechanism, the study potentially paves the way towards future spintronic devices employing spin-dependent electron scattering and transport.

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