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Probing the two-neutrino exchange force using atomic parity violation

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The exchange of two neutrinos at one loop leads to a long-range parity-violating force between fermions. In this talk, I will explore the two-neutrino force in the backdrop of atomic physics. This is the largest parity-violating long-range force in the Standard Model. The effect of this force can be searched for in experiments that probe atomic parity violation by measuring the optical rotation of light as it passes through a sample of vaporized atoms. I will present the results of calculations for the hydrogen atom to demonstrate this effect. Although the effect is too small to be observed in hydrogen in the foreseeable future, our approach may be applied to other setups where long-range parity violation is large enough to be probed experimentally.

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