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Progress toward a spin squeezed optical atomic clock beyond the standard quantum limit BORIS BRAVERMAN, AKIO KAWASAKI, VLADAN VULETIC, Massachusetts Inst of Tech-MIT — State of the art optical lattice atomic clocks have reached a relative inaccuracy level of 10^{-18}, already making them the most stable time references in existence. One restriction on the precision of these clocks is the projection noise caused by the measurement of the atomic state. This limit, known as the standard quantum limit (SQL), can be overcome by entangling the atoms. By performing spin squeezing, it is possible to robustly generate such entanglement and therefore surpass the SQL of precision in optical atomic clocks. I will report on recent experimental progress toward realizing spin squeezing in an ^{171}Yb optical lattice clock. A high-finesse micromirror-based optical cavity mediates the atom-atom interaction necessary for generating the entanglement. By exceeding the SQL in this state of the art system, we are aiming to advance precision time metrology, as well as expanding the boundaries of quantum control and measurement.

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