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*Two weight  $T1$  theorems for Sobolev and  $L_p$  spaces with doubling measures and Calderón-Zygmund operators.*

This is joint work with Brett Wick. We characterize two weight norm inequalities for Calderón-Zygmund operators from one weighted space to another, when the measures are doubling. We extend an earlier result of Michel Alexis, the speaker and Ignacio Uriarte-Tuero for  $L_2$  spaces, to  $L_2$ -Sobolev spaces of small order, and to  $L_p$  spaces. In the case  $p$  is not 2, we use variants of the quadratic Muckenhoupt conditions and weak boundedness properties introduced by Hytönen and Vuorinen. In particular, this proves their conjecture for the Hilbert transform in the case of doubling measures.