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**Square functions with independent increments
and Sobolev spaces on the real line**

The starting point of the talk is a symmetrization technique used by Verdera in one of the proofs of the L^2 boundedness of the Calderón commutator. The proof uses the L^2 bounds for a 'rough' square function on the real line which involves differences of difference quotients with independent increments. This square function was also used in a proof of the boundedness of the Cauchy integral on Lipschitz curves via Menger curvature, due to Melnikov and Verdera.

We shall report on further mapping properties of this type of square function, in particular to which extent it can be used to characterize Hardy-Sobolev spaces $\dot{H}_p^s(\mathbb{R})$ for $p \neq 2$. A local version of the square function is useful for characterizations of pointwise differentiability for functions in the Zygmund class.

Joint work with Julià Cufí, Artur Nicolau, and Joan Verdera.