NEW SUBREPRESENTATION FORMULAS CONNECTING FUNCTIONS, OPERATORS AND THEIR SMOOTHNESS

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In this talk, we present recent work with Cong Hoang and Kabe Moen, where we extend the classical Sobolev-type subrepresentation formula

$$|f(x)| \leq c_n \, I_1(|\nabla f|)(x),$$

in different ways. I_1 is the classical fractional integral operator or Riesz Potential of order one. First, we will show how to generalize I_1 to a family of A_1-potential type operators. Next, we show how the right-hand side can be further refined by using fractional derivatives instead of the gradient, incorporating the Bourgain-Brezis-Mironescu factor. We will also discuss the applications of these results to rough singular integral operators.

We will highlight the connections to isoperimetric inequalities and extrapolation theory.