Title: The Miracle of Extrapolation: Rubio de Francia extrapolation and its generalizations

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Abstract: In the 1980s, Rubio de Francia introduced the technique that bears his name in harmonic analysis. He showed that if an operator T satisfies a family of weighted norm inequalities,

$$\int_{\mathbb{R}^n} |Tf(x)|^2 w(x)\,dx \leq C \int_{\mathbb{R}^n} |f(x)|^2 w(x)\,dx$$

for all weights w in the Muckenhoupt A_2 class, then for $1 < p < \infty$,

$$\int_{\mathbb{R}^n} |Tf(x)|^p w(x)\,dx \leq C \int_{\mathbb{R}^n} |f(x)|^p w(x)\,dx$$

for all weights in the class A_p. The Muckenhoupt classes contain many useful weight functions (such as power functions $|x|^a$) that appear in applications. In particular, one can take $w \equiv 1$, which led a colleague of Rubio de Francia to remark, "There are no L^p spaces: there is only weighted L^2."

Since then Rubio de Francia extrapolation has become an important tool in harmonic analysis, with applications to partial differential equations and other fields. In particular, in the last 15 years there has been a great deal of work, extending the original ideas in a number of different directions. In this talk we will survey some of the classical and recent results, including sharp constant estimates, extensions to Banach function spaces, and extrapolation of bilinear inequalities.