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*The art of integration by parts*

The Integration by Parts Formula, which is equivalent with the Divergence Theorem, is one of the most basic tools in Analysis. Originating in the works of Gauss, Ostrogradsky, and Stokes, the search for an optimal version of this fundamental result continues through this day and these efforts have been the driving force in shaping up entire subbranches of mathematics, like Geometric Measure Theory.

In this talk I will review some of these developments (starting from elementary considerations to more sophisticated versions) and I will discuss recent result regarding a sharp divergence theorem with non-tangential traces. This is joint work with Dorina Mitrea and Marius Mitrea from University of Missouri, Columbia.