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**The divergence theorem involving the pointwise non-tangential trace**

De Giorgi-Federer produced a Divergence Theorem in an optimal class of domains $\Omega \subseteq \mathbb{R}^n$, domains of locally finite perimeter, for regular vector fields $\vec{F}$ with Lipschitz components. They proved that there exists a unique measure theoretic unit outer normal $\nu_\Omega$ such that

$$\int_\Omega \operatorname{div} \vec{F} \, d\mathcal{L}^n = \int_{\partial_*\Omega} \vec{F} \cdot \nu_\Omega \, d\mathcal{H}^{n-1},$$

where $\mathcal{L}^n$ stands for the $n$-dimensional Lebesgue measure, $\mathcal{H}^{n-1}$ the $n-1$-dimensional Hausdorff measure in $\mathbb{R}^n$, $\partial_*\Omega$ the measure theoretic boundary of $\Omega$. In this talk, this result is extended to vector fields in $L^1_{\text{loc}}(\Omega; \mathbb{R}^n)$ whose divergence belongs to $L^1(\Omega)$ and its non-tangential maximal function belongs to $L^1(\partial\Omega)$. This is a joint work with Dorina Mitrea, Irina Mitrea and Marius Mitrea.