1094-28-308 **Zoltan M Balogh** and **Piotr Hajlasz*** (hajlasz@pitt.edu), University of Pittsburgh, Department of Mathematics, 301 Thackeray Hall, Pittsburgh, PA 15260, and **Kevin Wildrick**.

Weak contact equations for mappings into Heisenberg groups.

Let $k > n$ be positive integers. We consider mappings from a subset of k-dimensional Euclidean space R^k to the Heisenberg group H^n with a variety of metric properties, each of which imply that the mapping in question satisfies some weak form of the contact equation arising from the sub-Riemannian structure of the Heisenberg group. We illustrate a new geometric technique that shows directly how the weak contact equation greatly restricts the behavior of the mappings. In particular, we provide a new and elementary proof of the fact that the Heisenberg group H^n is purely k-unrectifiable. We also prove that for an open set U in R^k, the rank of the weak derivative of a weakly contact mapping in the Sobolev space $W^{1,1}_{loc}(U; R^{2n+1})$ is bounded by n almost everywhere, answering a question of Magnani. Finally we prove that if a mapping from U to H^n is s-Hölder continuous, $s > 1/2$, and locally Lipschitz when considered as a mapping into R^{2n+1}, then the mapping cannot be injective. This result is related to a conjecture of Gromov. (Received August 26, 2013)