1166-30-37 **Sylvester Eriksson-Bique*** (sylvester.eriksson-bique@oulu.fi), Research Unit of Mathematical Sciences, University of Oulu, P.O. Box 3000, FI-90014 Oulu, Finland, and **Elefterios Soultanis** (elefterios.soultanis@unifr.ch), Department of Mathematics, University of Friburg, Chemin du Musee 23, 1700 Friburg, Switzerland. *Curvewise Characterizations of Minimal Upper Gradients and the Construction of a Sobolev Differential.*

Associated to Sobolev functions in a metric measure space there is a minimal upper gradient. We study geometric representations for this object. In this talk, I will present two main results of this flavor and which apply without either a Poincaré inequality or doubling. The first theorem shows that the minimal upper gradient can be realized as a maximal directional derivative, where the curves are selected by a disintegration of a plan on curves.

On the other hand, this leads to a notion of independence, charts and a differential for Sobolev functions. This gives the second theorem: a geometric construction of the Sobolev differential using directional derivatives, which coincides with Cheegers differential for spaces with a Poincaré inequality. Charts can be constructed when the Hausdorff dimension is finite, and combine to build a differential structure akin to a partial differential structure. The notion is also compatible and isomorphic to Gigli's differential and gives it a geometric meaning as a vector of partial derivatives. While I will not discuss much of the proofs, I will present the new definitions of a chart and differential in an accessible way and state some of their main properties. (Received February 04, 2021)