## Haefliger structures and wrinkling

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## Abstract:

Foliations in open manifolds were classified by Haefliger in "Feuilletages sur les variétés ouvertes". Using Gromov's method of flexible sheaves, he proved that the space of foliations (up to concordance) is weakly equivalent to the space of Gamma structures (i.e. cocycles valued in the étale Lie groupoid of diffeomorphism germs of Euclidean space), which may be thought of as foliations with singularities.

Gamma structures also appear naturally in the study of geometric structures other than foliations. From the perspective of Geometry of PDEs, this has been explored in the works of M. Crainic, M.A. Salazar, O. Yulidevich, F. Cattafi, and L. Accornero, among others. In a more homotopical direction, Haefliger himself observed that Gamma structures can be used to state classification results for symplectic and complex structures.

This latter perspective was recently pursued by Laudenbach and Meigniez. In "Haefliger structures and symplectic/contact structures", they present the construction of geometric structures as a two-step process. First, one attempts to construct a Gamma structure starting from some given formal data. Then, one tries to produce a genuine geometric structure starting from a Gamma structure. Their main result says that the first step can always be carried out in the contact/symplectic case.

In this talk I will explain how the wrinkling approach of Eliashberg-Mishachev may be used to produce Gamma-structures for any family of geometric structures given by an open and Diff-invariant partial differential relation. I will put particular emphasis in explaining how hprinciple ideas combine naturally with the Lie groupoid formalism needed to set up Gamma structures.

If time allows, I will explain the role played by this result in the classification problem for contact structures and conformal symplectic foliations.

This is on-going work with A. Fokma and L. Toussaint.