

**GAGC 2019**  
**CIRM, NOVEMBER 25TH – 29TH 2019**

**Louis-Clément Lefèvre:** Representation varieties of fundamental groups of complex algebraic varieties and mixed Hodge structures.

We study locally the representation varieties of fundamental groups of smooth complex algebraic varieties. These are schemes whose complex points parametrize such representations into linear algebraic groups. At a given representation, the structure of the formal local ring to the representation variety tells about the obstructions to deform formally this representation, which is ultimately related to topological obstructions to the possible fundamental groups of complex algebraic varieties. This was first described by Goldman and Millson in the case of compact Kähler manifold, using formal deformation theory and differential graded Lie algebras. We review this using methods of Hodge theory and of derived deformation theory and we are able to describe locally the representation variety for non-compact smooth varieties and representations underlying a variation of Hodge structure.